THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

With no noteworthy activity in the iron market, and here and there a lack of strength, there is nevertheless throughout the trade a feeling that the basis exists for both activity and buoyancy on the advent of the building season. The canvass of the prospects for steel construction in 1905, both in bridges and buildings, referred to in this review last week, bringing to light plans involving six to eight months' output of the structural mills of the country, is a good index to conditions that are making for the prosperity of the iron trade. That some of these projects are slow to develop is but in line with the deliberate movement of large interests in bringing forward security issues that are well known to be fully determined upon.

As always when there is a lull, the present quiet interval has created uneasiness in some quarters, but other opinion finds satisfaction in the absence of any feverish symptoms, and complacently awaits the development of the next buying movement. The pig iron market has presented two phases—the taking up of steel-making pig iron by large interests and the continued abstinence from the market of the average buyer of foundry iron. Some business in the latter is reported, however, Cincinnati sellers closing about 12,000 tons, of which 5,000 tons was taken by a pipe concern and 1,800 tons by a car works. Chicago notes foundry iron sales aggregating 10,000 tons. The reaction in foundry iron two to three weeks ago, particularly noticeable in the Central West, has been followed by a firmer market, with $16 minimum for No. 2 iron. Southern pig iron production, as the official figures show, came nearer in 1904 to the total for 1903 than might have been expected with the coal strike curtailing output for half the year.

There was not so thorough a cleaning up of speculative Bessemer pig iron in recent sales as was supposed, and $15.50 iron is still heard of, though the association furnaces adhere to $16. The probability that the Steel Corporation will be a further buyer for the next three months is discussed. In the melting steel market there have been ready buyers for recent large offerings. At the moment this market is easier.

Both iron ore and coke have been interesting features of the situation recently. Lake Superior ore producers, with no agreement as to prices, have been getting readily the advance asked over 1904 figures and have done a heavy business. The overproduction that has brought upon the soft coal producers of the Central West sharper competition in steam coals than they have known in some years, has not been in evidence in coking coal districts, and there are vigorous efforts on the part of the Steel Corporation and other interests to increase their holdings in Connellsville coal.

Rail business has been better than for some weeks. Orders from the Northern Pacific, New York, New Haven & Hartford and the Boston & Maine aggregate about 100,000 tons, added to a scattering business of 25,000 tons. The Baltimore & Ohio order for 25,000 tons is practically closed, and there are orders pending that represent about 150,000 tons more. The business booked for 1905 is now estimated at close to 1,000,000 tons.

The plate and structural mills seem already to be falling behind and the possibility of premiums for prompt delivery material when the more active season opens is having consideration.

It is believed that the great activity of tin plate mills does not mean that consumption is keeping pace with output but that material is being accumulated against eventualities in the labor world. A further slight advance in merchant pipe was made this week. Otherwise the finished material markets are unchanged. Steel billets are scarcer and independent rolling mills are unable to make calculations very far in the future.

PITTSBURG.

OFFICE OF *The Iron Trade Review*, 429 PARK BUILDING, Feb. 1.

While the iron trade continues to show great strength, there is little new buying either in raw or finished lines. The large tonnage of speculative Bessemer taken off the market during the past two weeks has evidently not cleaned up the speculative offerings, as considerable iron continues to be offered to the trade at $15.50, which is 50 cents below the price of the Bessemer Association furnaces. The association is holding firm at $16 and it is extremely doubtful if it can be shaded in the next two weeks or at all in this quarter. The United States Steel Corporation still needs outside iron and is figuring on future requirements, but how much will be taken has not been definitely decided. There have been few sales of foundry iron and prices range from $16 to $16.25 at the furnace. The situation among furnaces producing foundry grades is peculiar inasmuch as a number are oversold for the next three months, while others are badly in need of orders. Some of the latter caused the disturbance which forced down prices three weeks ago and those still eager for tonnage are holding the market at about $16.

The Lackawanna Steel Co. has practically disposed of its large accumulation of scrap, amounting to nearly 20,000 tons, the bulk of this material going to the Carnegie Steel Co. for shipment to Sharon at $16.25, delivered. Trades for some of this material were also made and Bessemer iron secured in return. This company is very short of iron and has decided to place its Lebanon, Pa., blast furnaces in operation and ship the Bessemer iron to its Buf-

falo steel plant. Two of the Lebanon furnaces are owned outright and the other three are leased. A by-product coke plant is operated in connection with these furnaces and preparations are being made to fire the ovens. In addition the company is attempting to secure a permanent coke supply in the Connellsville region, but nothing definite has yet been decided upon with reference to securing an operating property or purchasing the coal land for future development. The Republic Iron & Steel Co. will shortly begin work on 400 additional ovens in the region and an independent operation has decided upon the erection of 500 ovens.

The H. C. Frick Coke Co. on the other hand is endeavoring to further strengthen its holdings in the region and it is reported that negotiations are under way for the purchase of the ovens and coal land of the Hecla Coke Co. This would give the Steel Corporation 1100 additional ovens together with 5,000 acres of coal. This is one of the largest independent operations in the region and its purchase would result in curtailing the coke supply of several independent steel producers.

While it has been generally reported that the American Sheet & Tin Plate Co. is shipping the tin plate from its plants as fast as produced, it is learned on reliable authority that large stocks are being accumulated and it is asserted that they are almost as large as they were at this time last year. Officials of the company refuse to discuss the report. There is little doubt that these stocks are being accumulated for the purpose of withstanding a strike in the event of demands for increased wages on the part of the tin plate workers, and if these should not materialize at the April convention of the association, there will be a pretty general shutting down of tin plate mills during the second quarter until these stocks are worked off.

Both Bessemer and open-hearth billets continue very scarce and small finishing mills depending upon large producers for their requirements are not securing their material. Only a limited tonnage of prompt steel is being offered in the market and this is held at a premium of $3.50 for billets and $4.50 for sheet and tin bars. Today the leading pipe interests announce an advance of ½ point or $1 on all sizes of merchant pipe. The pipe trade continues to tax the capacity of the mills and, conditions considered, the advance is very conservative.

Pig Iron.—The iron market is quiet and owing to the small number of transactions it is difficult to locate the market. We note the sale of 2,500 tons of No. 2 foundry at $16.25 furnace, located east of Pittsburg, and owing to the location of the consumer the price is considered a good one for the furnace. Valley iron is offered at $16, furnace. Seceral foundry furnaces are heavily oversold, while others are eager for business and until the latter are filled up, low prices will continue to prevail. Speculative Bessemer continues to be offered in this market at $15.50, furnace, despite the recent heavy sales, and operators ar beginning to wonder how much iron was really sold to speculators on the late low market. The Bessemer Pig Iron Association refuses to shade $16, and there is little doubt that this price can be secured when all the speculative iron is cleaned up. Purchases by the United States Steel Corporation are expected within a few days, but the tonnage has not been fixed. Forge iron is held at $16 to $16.25, Pittsburg. We revise quotations as follows:

Bessemer, Valley	$15 50 to 16 00
Bessemer, Pittsburg	16 35 to 16 85
No. 1 Foundry	17 25 to 17 50
No. 2 Foundry	16 85 to 17 35
Gray Forge, Pittsburg	16 10 to 16 25
Basic, Valley	15 90 to 16 00
Basic, Pittsburg	16 75 to 16 85

Steel.—Independent finishing mills are having considerable trouble in securing steel to operate their plants, and Bessemer and open-hearth billets for prompt shipment are held at $24.50 to $25. Pittsburg, while sheet bars are quoted at $26.50 to $27. Large steel producers in this district are not making sufficient steel to meet the requirements of their finishing departments and the outside mills are not receiving shipments on their contracts.

Ferro-Manganese.—We quote domestic ferro, 80 percent, at $46, in carload lots, delivered at buyer's mill, any point east of the Mississippi.

Spelter.—The spelter market is somewhat weaker and prices are lower. We quote prime western grades at 6.17c to 6.20c, Pittsburg.

Muck Bar.—Muck iron is held nominally at $28.50 to $29, Pittsburg. It is doubtful whether any of the makers would sell under $29, although $28.75 might be done.

Skelp.—We note the sale of 1,000 tons of grooved steel skelp, February delivery, at 1.50c, Pittsburg. Sheared steel is held at 1.60c. Grooved iron is held at 1.80c to 1.85c, and sheared at 1.90c to 1.95c.

Rails and Track Materials.—Russia is reported in the market for 70,000 tons of standard section rails, and one of the leading trunk lines will shortly place an order, for 50,000 tons. Sales in the past week amount to about 100,000 tons. There is little demand for light rails, although prices are maintained owing to the high price of raw material. Fifty lb. and over 500 tons, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 16-lb., $27 to $28; 20 lb., $25 to $26; 25 to 45 lb., $23 to $24. Angle bars, 1.25c; spikes, 1.85c to 1.90c.

Plates.—Despite the fact that there is little demand for plates from the boiler, tank and shipbuilding trades, the mills are gradually falling behind on their orders on account of the heavy demands of the steel car builders. Little new business is being placed, but the specifications on contracts are growing heavier daily. We continue to quote as follows: Tank plates, 1¼ in. thick, 6¼ to 14 in., inclusive, 1.40c f. o. b. mill Pittsburg; over 14 in. up to 100 in., 1.50c. Extras are as follows per lb.: Flange and boiler steel, 10c; marine, A. B. M. A., and ordinary fire box, 20c; still bottom, 30c; locomotive fire box, 50c; plates over 100 in. up to 110 in. in width, not less than 5c per 100 lb. extra; plates 110 in. to 115 in. wide, not less than 10c extra; 115 to 120 in., 15c extra; plates 120 in. to 125 in wide, not less than 25c extra; plates, 125 in. to 130 in., not less than 50c extra; plates 130 in. wide, not less than $1 extra; plates 3-16 in. thick, $2 extra; gauges 7 and 8, $3 extra; No. 9, $5 extra. Five cents extra for less than carloads. Terms net cash in 30 days, and for all points of delivery in the United States except the Pacific Coast.

Bars.—The order for 1,000 tons of bar iron has not yet been placed by the Pressed Steel Car Co., although the business will no doubt be closed this week. The market is firm at 1.70c, Pittsburg. On steel bars one of the leading interests is asking a premium of $2. We quote as follows: Bar iron, 1.65c to 1.69¼c Pittsburg; hoops, 1.55c, and bands, 1.40c, both taking bar extras. Bessemer steel bars, 1.40c; open-hearth steel bars, 1.40c; plow and cultivator beams, 1.40c, net; channels, angles, zees and tees, under 3 in., 1.05c. The following differentials are maintained on steel: Less than 2,000 lb. of a size and not less than 1,000 lb., 10 cents advance; less than 1,000 lb. of a size, 30 cents advance.

Structural Material.—Most of the structural shops in this district have large orders on hand, and the structural mills are well filled for this season of the year. Quotations are unchanged: Beams and channels up to 15 in., 1.50c; over 15 in., 1.60c; angles, 3 x 2 up to 6 x 6, 1.50c; zees, 1.40c; tees, 1.55c; angles from 3 to 16 in., 1.50c; universal and sheared plates, 6¼ to 14 in., inclusive, 1.40c; over 14 in., 1.50c base.

Sheets.—Demand for sheets for prompt delivery continues heavy, while all mills are operating at a greater capacity than any time in the past year and a half. Jobbers are laying in heavy stocks anticipating another advance,

which is looked for shortly. We make the following quotations: No. 30, 2.70c; No. 29, 2.60c; No. 28, 2.30c; No. 27, 2.20c; Nos. 25-26, 2.15c; Nos. 23-24, 2.10c; Nos. 18-20, 2.05c; No. 16, 2c; Nos. 12-14, 1.95c; No. 9, 1.90c; No. 8, 1.85c. Galvanized: No. 30, 4.25c; No. 29, 3.75c; No. 28, 3.35c; No. 27, 3.15c; Nos. 25-26, 2.95c; Nos. 23-24, 2.75c; Nos. 18-20, 2.60c; No. 16, 2.45c.

Wire and Wire Nails.—Heavy stocks are being accumulated in all the warehouses of the wire and nail manufacturers in anticipation of a heavy spring trade. An advance in prices is expected this week, but as yet no announcement has been made. Quotations are unchanged as follows: Wire nails, jobbers' carload lots, $1.75; retailers' carload lots, $1.80, and less than carloads, $1; painted barb wire, $1.90 to jobbers in carloads; retailers' carloads $1.95, and less than carloads $2.05, with 30 cents for galvanizing. Annealed smooth fence wire is held at $1.60, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 percent discount for cash in ten days. Iron cut nails are held at $1.85 Pittsburg, and steel at $1.75.

Pipes and Tubes.—Merchant pipe was advanced today ½ point or about $1 a ton. Demand not only for merchant sizes, but line pipe as well is exceedingly heavy. Discounts to consumers, carload lots, f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book, are as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛ and ¼ inch	68	52	66	50
⅜ to 6 inches	76	66	74½	64½
⅜ and ½ inch	72	60	70	58
7 to 12 inches	71	56	69½	54
Extra Strong Plain Ends.				
⅛ to ⅜ inch	61	49	59	47
½ to 4 inches	68	56	66	54
4½ to 8 inches	64	52	62	50
Double extra strong plain ends, ½ to 8 inches	57½	46½	55½	44½

MERCHANT BOILER TUBES, CARLOADS, 22 FEET AND UNDER.

	Steel	Iron.
1 to 1½ inches	46	43
1¾ to 2½ inches	58	43
2½ inches	60	48
2¾ to 5 inches	66	55
6 to 13 inches	58	43

Less than carloads 2 points less.

Merchant Steel.—Demand continues strong, although prices continue practically unchanged. Demand for shafting is improving although there will be no distinct revival until there is more new construction. Cold rolled and ground shafting, 52 percent off in carload lots, and 47 off in less than car lots, delivered in base territory; tire steel, 1.60c to 1.65c; open-hearth spring steel, 2c to 2.10c; sleigh shoe, flat, 1.55c to 1.60c; smooth finished machinery steel, 1.60c; toe calk, 1.95 to 2c.

Old Material.—The Lackawanna Steel Co. has disposed of about 20,000 tons of heavy melting stock in the past two weeks. The Carnegie Steel Co. took the bulk of this material at about $16.25, delivered Sharon. About 7,000 tons was exchanged for rail seconds, the latter going to a Buffalo concern, under a deal between the Lackawanna Steel Co. and an old material company. The Tennessee Coal, Iron & Railroad Co. has also disposed of about 8,000 tons of low phosphorus scrap in this and western markets. Heavy melting stock is somewhat easier, being quoted at $16 to $16.25, and guaranteed low phosphorus stock is $19.50 to $20. One independent steel interest is in the market for a large tonnage, but dealers are inclined to hold out for somewhat higher prices than those quoted above. We quote for gross tons as follows: Heavy melting stock, $16 to $16.25; low phosphorus, $19.50 to $20.00; rerolling rails, $16.50 to $17; sheet scrap, $15 to $15.25; No. 1 wrought, $19.50 to $20; cast iron borings, $11 to $11.50.

Coke.—The coke market is somewhat easier, strictly Connellsville furnace coke being held at $2.50 to $2.60 for prompt shipment, and foundry is held at $2.85 to $3. The coke shipments to the west are heavy, but a lack of suitable cars has hindered eastern shipments. Coke production continues heavy and at the rate of about 17,000,000 tons annually. During the week ending Saturday, Jan. 21, the upper region produced 255,393 tons and the lower region produced 74,589 tons.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Jan. 31.

The dullness of last week is gradually giving way to the resumption of buying on the part of interests so varied as to give a tone to the whole market. By this is not meant that a heavy buying movement is on, but rather that there is a noteworthy improvement. One factor in the present situation is that the mills are so full of business that their agents in this market are restrained from making an active campaign for business. What activity is shown, therefore, originates with the buyers themselves. Mills are taking the position that prices are likely to advance and that they are so full of orders at present figures that they are desirous of limiting additional business so as to leave room for higher priced orders later on. About 10,000 tons of foundry iron was bought in the Chicago market last week, the largest buyers being pipe and fitting manufacturers. Northern irons are unchanged at $17.50 Chicago for No. 2 foundry and there seems to be less and less Southern for sale on the $13.50 basis, though there is as yet no evidence of any sale in this district made at $14. Orders for about 50,000 tons of standard section steel rails were taken by the leading Western mill last week. No changes in prices or conditions appear in structural steel, plates, sheets, bars, pipe or tubes, but the market all the way through is more than holding its own. The scrap market is recovering slightly from the depression of the last two or three weeks, as there are more advances than declines in this week's schedule. Wire mills are busy and prices are unchanged. The leading producer as well as independents are still limiting their contracts to 60 days delivery.

Pig Iron.—One of the largest Southern producers has practically withdrawn from this market by holding $14 Birmingham as the minimum for No. 2, and there is more prospect this week than there was last that this price will be reached. Quite a large tonnage moved within the last six or seven days in from 1,000 to 3,000 ton lots on the basis of $13.50 Birmingham for delivery in the first and second quarters. Considerable Northern iron was also sold, its basis being $17.50 Chicago for No. 2. We quote:

Lake Superior Charcoal	$18 50 to 19 00
Northern Foundry No. 1	18 00
Northern Foundry No. 2	17 50
Northern Foundry No. 3	17 00
Northern Scotch Foundry	18 50
Ohio Strong Softeners No. 1	19 30 to 19 80
Ohio Strong Softeners No. 2	18 30 to 18 80
Southern Foundry No. 1	17 65 to 18 15
Southern Foundry No. 2	17 15 to 17 65
Southern Foundry No. 3	16 65 to 17 15
Southern Foundry No. 4	16 40 to 16 90
Southern No. 1 Soft	17 65 to 18 15
Southern No. 2 Soft	17 15 to 17 90
Southern Gray Forge	16 40
Southern Mottled	16 40
Southern Silveries (4% to 6% Silicon)	18 65 to 19 15
Jackson Co. Silveries (6% to 8% Silicon)	20 30 to 22 30
Jackson Co. Silveries (8% to 10% Silicon)	22 30 to 22 80
Alabama and Georgia Car Wheel	21 15
Malleable Bessemer	17 50
Basic Iron	17 65 to 18 15

Billets.—Demand for forging billets has already reached a point where it threatens to exceed the supply. Prices are very firm and rule about $1 higher than last week, making the prices on 4 x 4 and larger, up to but not including 10 x 10, up to .25 carbon, $28; up to and including .60 carbon, $1 extra. Rerolling billets, Bessemer or open-hearth, 4 x 4 and larger, $25; billets, 3⅞ in. and smaller,

and sheet and tin bars, $27. Wire rods, $32 to $33 Pittsburg.

Bars.—Prices on both iron and steel bars are unchanged and firm. We quote carload lots, mill shipments, Chicago delivery, as follows: Bar iron, 1.65; Bessemer and open-hearth bars and bands, 1.56½c base, half extras; soft steel angles, less than 3 x 3, 1.76½c; hard steel angles, 1.60c to 1.65c; hoops, 1.71½c base, full extras. Store quotations are firm, and we quote on lots from warehouse stocks, as follows: Bar iron, 1.90c to 2c base, full extras; soft steel bars and bands, 1.75c to 1.85c base, half evtras; soft steel angles, channels and tees, 1.85c to 1.95c; hoops, 2c to 2.10c base, full extras.

Sheets.—No price changes have been made within a week but the tone of the steel sheet market is stronger and already some producers are beginning to make the stereotyped excuses for failure to make shipments on dates promised. We quote carload lots, mill shipments, Chicago delivery, as follows: Blue annealed sheets, Nos. 9 to 10, 1.81½c to 1.86½c; Nos. 11 and 12, 1.86½c to 1.91½c; Nos. 13 and 14, 1.91½c to 1.96½c; Nos. 15 and 16, 2.01½c to 2.06½c. On box annealed, one pass, cold rolled, we quote Nos. 18 and 20, 2.21½c to 2.26½c; Nos. 22 and 24, 2.26½c to 2.31½c; Nos. 25 and 26, 2.31½c to 2.36½c; No. 27, 2.36½c to 2.41½c; No. 28, 2.46½c to 2.51½c; No. 29, 2.56½c to 2.61½c; No. 30, 2.66½c to 2.71½c. We quote on lots from warehouse stocks as follows: No. 10, 2c to 2.05c; No. 12, 2.05c to 2.10c; No. 14, 2.10c to 2.15c; No. 16, 2.20c to 2.25c; Nos. 18 and 20, 2.40c to 2.45c; Nos. 22 and 24, 2.45c to 2.50c; No. 26, 2.60c to 2.65c; No. 27, 2.70c to 2.75c; No. 28, 2.80c to 2.85c; No. 29, 2.90c to 2.95c. Galvanized sheets, mill shipments, Chicago delivery, are quoted without change as follows: Nos. 12-14, 2.46½c; No. 16, 2.61½c; Nos. 18-21, 2.76½c; Nos. 22-24, 2.91½c; No. 26, 3.11½c; No. 27, 3.31½c; No. 28, 3.51½c. Jobbers' prices on lots from store are as follows: Nos. 10 to 16 inclusive, 3c; Nos. 18 and 20, 3.01c; Nos. 22 and 24, 3.15c to 3.20c; No. 26, 3.38c to 3.40c; No. 27, 3.60c; No. 28, 3.83c; No. 29, 4.20c to 4.25c; No. 30, 4.73c.

Structural Material.—The recent increase in demand for structural steel on the part of railroads for bridges and buildings, principally the former, and the very large orders booked by car builders and boat builders in addition to the almost incredible tonnage of buildings that are on architects' drawing boards leads to the conclusion that every structural steel mill in the market may be taxed to its utmost to supply the demand for the balance of this year. Of course many of these propositions will not materialize but enough will to make the year a noteworthy one in this line. Prices are unchanged. We quote prices unchanged on carload lots, mill shipments, Chicago delivery, as follows: Beams and channels, 3 to 15 in. inclusive, 1.66½c; angles, 3 to 6 in., ¼ in. and heavier, 1.66½c; angles, larger than 6 in. on one or both legs, 1.76½c; beams larger than 15 in., 1.76½c; zees, 3 in. and over, 1.66½c; tees, 3 in. and over, 1.76½c, with the usual extras for cutting to exact lengths, punching, coping, bending or other shop work. Store prices have been advanced, and, according to tonnage, are quoted: 1.90c to 2c for angles, beams and channels, base sizes, with 2c to 2.10c for 18, 20 and 24-in. beams; tees and zees, 1.95c to 2.05c. These prices are for either random lengths or cut to specifications.

Plates.—The producing capacity of plate mills in the last year or two has been increased notably; otherwise there might be some doubt of the ability of mills to supply the demand that is alreadv making itself felt. Immediate trading is very light but mill order books are fat and producers are indifferent to greatly added tonnage at present figures. Prices are unchanged, and we quote carload lots, mill shipments, Chicago delivery, as follows: Tank steel, ¼ in. and heavier, 6¼ in. to 14 in. wide, rectangular plates only, 1.56½c base; over 14 in., to 100 in., 1.66½c base, flange steel, 1.76½c base; marine steel, 1.86½c base, all full extras. Plates, 3-16 in. thick, $2 extra; gauges 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. Store prices are very firm. We have revised our quotations as follows: Tank steel, ¼ in. and heavier up to and including 72 in. wide, 1.90c; over 72 in. wide up to 100 in., 1.10c extra; over 100 in. wide, usual mill extras; 3-16 in. up to but not including 72 in. wide, 2c; 3-16 in., 72 in. wide, 2¼c; flange steel, 25c extra; heads, 25c extra.

Rails and Track Supplies.—The leading Western rail mill has taken orders for about 50,000 tons during the last week or ten days, making about 400,000 tons booked in the last seven weeks. Track supplies have advanced under the influence of greatly increased demand. We quote heavy sections in 500-ton lots and over, f. o. b. bill, $28; less than 500 tons to carload lots, $30; less than carload lots, $32. Light rails are as follows: 12-lb. sections, $27; 16-lb., $26; 20 and 25-lb., $25; 30, 35, 40 and 45 lb. sections, $24, all f. o. b. Milwaukee mill. Track supplies, f. o. b. Joliet mill: Angle bars, 1.40c to 1.50c; spikes, first quality, 1.70c to 1.75c; track bolts, 3¼ x ¾, with square nuts, 2.40c to 2.50c per lb., with hexagon nuts 2.50c to 2.55c.

Merchant Steel.—Specifications are only fairly heavy but mill order books are full to their rolling limits. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 2c; sleigh shoe, flat sizes, 1.61½c; concave and convex, 1.76½c; cutter shoe, 2.25c; smooth finished machinery steel, 1.81½c; smooth finished tire, 1.76½c; plow steel, 2.20c and upwards, according to quality; toe calk steel, 2.11½c. Crucible tool steel, 6½c to 8c; special grades of tool steel, 13c and upwards. Cold rolled shafting is quoted at 52 percent from list on carload lots, and 47 percent discount on less than carload lots.

Merchant Pipe.—Business shows no diminution and is unusually heavy for this time of year. Prices are without change, and we quote carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

MERCHANT PIPE.

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛ and ¼ inches	66.85	50.85	64.85	48.85
⅜ and ½ inches	70.85	58.85	68.85	56.85
¾ to 6 inches	74.85	64.85	73.35	63.35
7 to 12 inches	69.85	54.85	68.35	52.85
	Extra Strong Plain Ends.			
⅛ to ¼ inches	59.85	47.85	57.85	45.85
⅜ to 4 inches	66.85	54.85	64.85	52.85
4½ to 8 inches	62.85	50.85	60.85	48.85
XX Strong Plain Ends	55.85	44.85	53.85	42.85

Boiler Tubes.—The boiler tube situation has apparently been greatly strengthened by the $4 advance made Jan. 19, even though present buying is not particularly active.

BOILER TUBES.

	Steel.	Iron.	Seamless.
1 to 1½ inches	42.35	39.35	52.35
1¾ to 2¼ inches	54.35	39.35	40.35
2½ inches	56.35	44.35	43.35
2¾ to 5 inches	62.35	51.35	Up to 4 inches.
			50.85
6 to 13 inches	54.35	39.35	.....

There is no agreement on store prices and discounts of various jobbers differ from ½ to 1½ percent. A fair average of prices on small lots from store is as follows:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches, inclusive	40½	37½	40
1¾ to 2¼ inches, inclusive	50½	35	37½
2½ inches, inclusive	53	37½	40
2¾ to 5 inches, inclusive	60¼	47½	47½
6 inches and larger	50½	35	

Cast Iron Pipe.—No contracts of moment have been placed by the leading producer, but inquiry is larger than usual at this time of year and pick-up business is good. Prices are without change, and we quote carload lots, Chicago delivery, as follows: 4-in. water pipe, $28.50; 6-in. and larger, $27.50; gas pipe, $1 a ton higher.

Wire Products.—Demand for nails, barb wire, smooth fire, poultry netting, woven wire fencing and other wire

products is exceptionally large and the utmost efforts of producers are required to keep pace with the demand. Prices are unchanged and are considered lower than the condition of the trade warrants. We quote carload lots, mill shipments, Chicago delivery, as follows: Wire nails, $1.90; painted barb wire, $2.05; galvanized barb wire, $2.35; smooth annealed wire, $1.75; smooth galvanized wire, $2.05; polished staples, $2; galvanized staples, $2.30. Less than carload lots to jobbers are 5 cents higher than above prices. The retail trade is quoted 5 cents extra over the foregoing on carload lots, and 10 cents extra on less than carload lots. Bale ties are unchanged at 82½ and 5 per-cent to 85 percent discount f. o. b., Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet and DeKalb, with actual freight allowed not exceeding 30 cents per 100 ib.

Foundry Coke.—Demand is improving and the freight situation is a little less wretched than it has been. Prices are firm on the basis of $3 at Connellsville for 72-hour foundry grade or $5.65 Chicago in car lots. Less popular brands of Virginia and West Virginia cokes are selling at from $2.50 to $2.75 at the ovens. Wise County Virginia coke at $3 at the ovens makes the going price here $5.25.

Old Materials.—The market is somewhat steadier than it was a week ago with signs of recovery from last week's relapse. We quote:

Old steel rails (4 feet and over)	$15 00 to 16 00
Old steel rails (less than 4 feet)	15 50 to 16 00
Old iron rails	21 00 to 21 50
Relaying rails, subject to inspection	22 00 to 22 50
Relaying rails, without inspection	20 00 to 20 50
Old wheels	16 50 to 17 00
Heavy melting steel	14 50 to 15 50
Mixed country steel	9 50 to 10 50
Low phosphorus scrap (.05 and under)	14 00 to 14 50

The following quotations are for net tons:

No. 1 R. R. wrought	17 50 to 18 00
No. 2 R. R. wrought	16 00 to 17 00
Shafting	17 50 to 18 00
Dealers' forge, No. 1	14 50 to 15 00
Wrought pipe and flues	13 00 to 13 50
No. 1 cast, 150 lb. and less	14 00 to 14 50
No. 1 mill	11 00 to 11 50
No. 1 Busheling	12 50 to 13 00
No. 2 Busheling	11 00 to 11 50
Country sheet	8 00 to 8 50
No. 1 boilers, cut	12 00 to 13 00
Boiler punchings	14 50 to 15 00
Iron car axles	21 50 to 22 50
Steel car axles	17 00 to 17 50
Iron axle turnings	12 00 to 12 50
Steel axle turnings	16 00 to 16 50
Cast borings	9 00 to 9 50
Mixed borings, etc	9 00 to 9 50
Machine shop turnings	11 50 to 12 00
Railroad malleable	14 00 to 14 50
Agricultural malleable	12 00 to 13 00
Stove plate and light cast scrap	11 50 to 12 00
Old iron splice bars	18 00 to 18 50

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
BROWNING BUILDING, Feb. 1.

Iron Ore.—On account of the large sales of ore made during the past four weeks, there is now little activity in the market. Some misleading statements have been published recently in regard to purchases of ore by producing-consuming interests, which have been spoken of as showing unprecedented conditions. It is true this year, as it has been in the past, that some firms and companies that mine and sell ore have bought for their own use, but it is done because their own ores do not have some particular content needed in their mixtures. For example, one Cleveland firm which sells ore and also operates blast furnaces has purchased, for use in making one brand of pig iron, certain ore on account of its alumina, which its own ores did not have. It is not true, however, that there has been large purchasing by those interests.

The sale of twelve whaleback vessels of the steel corporation's fleet means the beginning of the passing of the "pig" from the lakes. The corporation still has fifteen vessels of this type, but they are for sale and will in time be replaced by steam vessels of large tonnage. The principal objection to the whaleback is that its hatches are so constructed that automatic ore unloading machinery can not be used.

Pig Iron.—The softness of the foundry pig iron market, which was marked two weeks ago, when No. 2 was sold at $15.50 at some stacks, has now almost entirely disappeared, and while it might be possible to shade $16 on a large order, ordinary business is being done at $16. There is no heavy buying, but calls for delivery on contracts show that the iron is being melted more rapidly than for many weeks. Southern iron is very dull in this locality owing to the high quotations, which are still $13.50 to $14, Birmingham, for No. 2. We quote as follows, Cleveland delivery:

Bessemer	$16 85 to 16 95
No. 1 Foundry	17 00 to 17 50
No. 2 Foundry	16 50 to 16 85
No. 3 Foundry	15 75 to 16 00
No. 2 Southern	17 35 to 17 85
Gray Forge	16 00 to 16 25
Gray Forge, Southern	16 00 to 16 60
Lake Superior charcoal	18 00 to 18 50

Finished Material.—One hears much more about mill operations than sales, as the plants are extremely busy and deliveries seem to be falling farther behind. This is especially true of plates and shapes. One result is that jobbers are getting many orders at store prices from consumers who can not obtain prompt delivery from mills. Bar iron sells slowly at 1.65c at the mills. Steel bars are firm at 1.49½c, Cleveland, and mills are not making prompt shipments. The demand for sheets is strong and the mills are filled with orders. The prices of the principal producers through jobbers are as follows: Cleveland delivery, the freight from Pittsburg being 9½ cents: Mill sales of black sheets in carload lots, No. 10, 1.79½c; Nos. 11-12, 1.84½c; No. 14, 1.89½c; No. 16, 1.99½c; No. 27, 2.39¼c; No. 28, 2.40¼c. Galvanized, mill sales, No. 14, 2.54¼c; No. 16, 2.64¼c; Nos. 18-20, 2.84½c; Nos. 22-24, 2.94½c; No. 25, 3.14½c; No. 27, 3.34½c; No. 28, 3.54¼c. Out of stock, black sheets, ¼ in., 1.80c; 3-16 in., 1.90c. Blue annealed, No. 10, 2.05c; No. 12, 2.10c; No. 14, 2.15c; No. 16, 2.25c One pass cold rolled: Nos 18-20, 2.45c; Nos. 22-24, 2.50c; No. 26, 2.55c; No. 27, 2.60c; No. 28, 2.70c; No. 30, 3.10c. Galvanized out of stock, No. 16, 2.85c; Nos. 18-20, 2.95c; Nos. 22-24, 3.40c; No. 26, 3.30c; No. 27, 3.50c; No. 28, 3.70c; No. 30, 4.50c.

Old Material.—The market is still very quiet, but prices have not yielded and the outlook is slightly better than it was last week. We quote as follows, gross tons, Cleveland:

Old iron rails	$24 00 to 25 00
Old steel rails (over 6 feet)	16 50 to 17 00
Old steel rails (under 6 feet)	17 00 to 17 50
Old car wheels	17 50 to 18 00
Steel boiler plate	13 00 to 13 50
Steel axles	18 00 to 19 00
Malleable iron (railroad)	15 50 to 16 00
Malleable iron (agricultural)	14 50 to 15 00
Heavy steel	16 50 to 17 00

We quote as follows, net tons:

No. 1 R. R. wrought	17 00 to 17 50
No. 1 busheling	14 50 to 15 00
No. 1 machine cast	14 50 to 15 00
Iron axles	21 00 to 22 00
Axle turnings	13 00 to 13 50
Wrought turnings (free from cast)	12 00 to 12 50
Grate bars	10 00 to 10 50
Pipes and flues	13 00 to 14 00
Tank iron	11 00 to 12 00
Hoop and band iron	9 00 to 10 00
Sheet iron	7 00 to 8 00
Wrought drillings	12 00 to 13 50
Stove plate	11 00 to 11 50
Cast borings	8 50 to 9 00

CINCINNATI.

Jan. 31.

In foundry coke the situation is less strained and the market has become easier with quotations around $3 per ton f. o. b. ovens. Furnace coke for prompt shipment is still in limited supply with prices at $2.50 to $2.75 per ton f. o. b. ovens. January shipments of coke were quite large, which has considerably relieved the stress on the part of consumers.

Pig Iron.—The week has developed practically nothing new in the situation. A few round lot purchases are reported including 5,000 tons for an Ohio pipe manufacturer, 1,800 tons to a car building concern, several thousand tons to a large Ohio manufacturer, but the details of these transactions are not made public.. The rank and file of buyers are holding off and business consists of a few scattering lots from a car load up to 200 or 300 tons. The market has now assumed an appearance of dullness which is creating some uneasiness in the minds of pig iron selling agencies. At the same time reports generally reflect a liberal consumption of pig iron and it is understood that buyers have covered their requirements for the first quarter of the year and that furnaces are well sold up for that period. There are those in the trade who confidently look for a resumption of buying in the near future and furnace interests do not seem to regard the present dullness with apprehension. There is perhaps more willingness on the part of furnaces to accept present prices for second quarter delivery but no intimation of a disposition to shade prices in order to induce business is made from those furnaces which are most ready to offer their product at current rates. There seems to be more activity in the pig iron markets of the East than in the West. Scattering reports are made of concerns coming into the market that were supposed to have been fully covered for the first quarter, showing that in some instances buyers had under-estimated their requirements. We make no change in quotations, which are as follows, f. o. b. Cincinnati:

Southern Foundry No. 1	$16 75 to 17 00
Southern Foundry No. 2	16 25 to 16 50
Southern Foundry No. 3	15 75 to 16 00
Southern Foundry No. 4	15 50 to 15 75
Southern Foundry No. 1, soft	16 75 to 17 00
Southern Foundry No. 2, soft	16 25 to 16 50
Gray Forge	15 25 to 15 50
Northern Foundry No. 1	17 65 to 18 15
Northern Foundry No. 2	17 15 to 17 65
Northern Foundry No. 3	16 65 to 17 15
Southern Charcoal	19 50 to 19 75

Finished Material.—Demand continues active and with mills behind in their orders. The jobbing demand is active. The advance in bar iron is well sustained. Bar iron is quoted at 1.75c; steel bars at 1.53c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets at 75 and 10 and 5 percent off. We quote black sheets, No. 27, at 2.40c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.70c; No. 27, 2.60c; No. 16, 2.20c; No. 14, 2.10c; No. 12, 2.05c; No. 10, 2c. Tank plates are firm and sell out of stores at 1.90c for ¼-in. and 1.95c for 3-16 No. 8 and No. 10. Beams and channels are quoted at 1.90c to 2c from stock, and angles at 1.95c to 2c for base sizes.

In merchant pipe prices are unchanged and independent mills are quoting close to the schedule to the leading interest. Demand from stock is active. Boiler tubes are unchanged with quotations furnished only upon application with specifications. We quote carload lots f. o. b. Cincinnati as follows:

MERCHANT PIPE.

(Basing Discounts.)

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ and ¼ inches	66.85	50.85	64.85	48.85
⅜ and ½ inches	70.85	58.85	68.85	56.85
¾ to 6 inches	74.85	64.85	78.35	63.35
7 to 12 inches	69.85	54.85	68.35	52.85

Old Material.—The market is quiet and an easy tone prevails but there is no change in quotations. The following prices represent dealers' selling figures, f. o. b. Cincinnati:

Old No. 1 railroad wrought, net tons	$16 50 to 17 00
Cast machine and foundry, net tons	13 50 to 14 00
Old iron rails, gross tons	20 00 to 21 00
Old steel rails, gross tons	15 00 to 15 50
Old short lengths, gross tons	14 00 to 14 50
Old iron axles, net tons	19 00 to 20 00
Stove plate, net tons	9 50 to 10 00
Wrought turnings, net tons	12 50 to 13 00
Cast borings, net tons	9 00 to 9 50

Hickman-Williams & Co. have moved their Cincinnati office from the 9th to the 13th floor of the Union Trust building. The office force of the Cincinnati office has been enlarged and larger quarters were necessary, which occasioned the move.

T. J. Joyce, for many years associated with the Dumhoff & Joyce Co., has sold his interest to that company and has retired from business. The company will continue business without any change of firm name.

PHILADELPHIA.

Jan. 31.

The snow and very cold weather have interfered with business to some extent, but the volume of transactions has been large. Mills are fully employed and prospects are favorable.

Pig Iron.—Buying of basic of low phosphorus has been the leading feature, the latter selling at prices somewhat above recent quotations. Jobbing founders report some improvement in business. The severe weather has greatly interfered with the delivery of coke. We quote as follows: No. 1 X foundry, $18 to $18.25; No. 2 X foundry, $17.50 to $17.75; No. 2 plain, $16.75 to $17.00; Standard gray forge, $16 to $16.25; basic, $16.50 to $16.75; low phosphorus, $20 to $20.25.

Finished Material.—The demand is steady, but without a great rush rush of orders. Specifications are coming in fairly well. Prices are firm. We quote as follows: Beams and channels up to 15 inches, 1.63c; over 15 inches, 1.73½c; small angles, 1.63½c; large angles, 1.73½c; steel bars, 1.63½c; refined iron, 1.65 to 1.70c; plates, 1.63½c.

Old Material.—The market is dull, as buyers consider prices too high. Some concessions are being made by dealers. We quote: No. 1 steel scrap, $17.50 to $18; low phos scrap, $21 to $22; old steel axles, 20.50 to $21; old iron axles, $23.50 to $24; old iron rails, $23 to $24; old car wheels, $16 to $16.50; choice railroad No. 1 wrought, $21.50 to $22; machinery scrap, $16 to $16.50; wrought turnings, $14.50 to $15; cast borings, $11.25 to $11.75; stove plate, $13.75 to $14.25; wrought iron pipe, $17 to $17.50.

NEW YORK.

OFFICE OF *The Iron Trade Review*.
ROOM 1315, NO. 150 NASSAU ST., Jan. 31.

Pig Iron.—The past week in the local pig iron market was one of the quietest for two months. The tonnage comprised nothing to speak of and the dullness was accompanied by some irregularity in prices that is usual when sales fall off. On the whole prices are little changed, although not having the strong undertone that has characterized them for several weeks past. In some quarters it is said that Northern No. 2 foundry sold at $16.50 at Eastern Pennsylvania furnaces during the past week, but the majority of sellers say that $16.75 was the minimum. Others quote $17, but no sales at this figure can be verified. For Southern No. 2 foundry there are some quotations as low as $13.50, and sales aggregating a few hundred tons at this price can be noted. But with the rank and file of furnaces $13.75 is being maintained, while now and then $14 is mentioned, but a sale has yet to be made at this price. Only occasionally are sales made nowadays for immediate shipment, as it seems the majority of consumers are pretty well supplied for this delivery. The bulk of sales recently has been for delivery the second quarter. There does not seem to be any great eagerness on the part of buyers to contract for the third quarter, and sales made so far for this shipment are meagre. New York quotations at tidewater follow: Northern No. 1 foundry, $17.50 to $18; No. 2 foundry, $17.25 to $17.50; No. 2 plain, $16.75 to $17; Southern No. 1

foundry, $17.50 to $17.75; No. 2 foundry, $17 to $17.25; No. 3 foundry, $16.50 to $16.75; No. 4 foundry, $16 to $16.25. Pig iron warrants are as follows:

	Bid.	Asked.
January	17.10	....
February	16.40	16.55
March	16.50	16.75
April	16.50	16.75
May	16.50	16.75
June	16.60	....
July	16.50	....

Finished Iron and Steel.—Business in structural shapes during the past week was quiet, the only important contract taken being one for 5,000 tons from the Northern Pacific road by the American Bridge Co. The company reports its sales for January to be about 40,000 tons, which it considers a normal month. There is a goodly lot of fabricated work in sight, and comprising proportions which have all but approached the closing stage, but postponements are frequent and unexplainable. The demand for plates keeps up pretty good, but it is almost exclusively confined to small lots. Bars are firm, but new business is light. The sheet market is only moderately active. New York prices at tidewater follow: Angles, 3 to 6 in. x ¼ in. and heavier, 1.64½c; beams, 3 to 15 in., 1.64½c; channels, 3 to 15 in., 1.64½c; beams, 18, 20 and 24 in., 1.74½c; tees, 3 x ¼ in. and heavier, 1.69¼c; plates, carloads, tank, 1.64½c; flange, 1.74½c; marine and ordinary fire box, 1.84½c; refined iron bars, 1.64¼c; soft steel bars, 1.54½c to 1.60c; sheets, in carload lots, New York, No. 28, black, 2.50c to 2.55c; galvanized, 3.55c to 3.60c.

Rails.—The market has been rather active and orders for a total of 125,000 tons have been placed in the week. The B. & O. order for 25,000 tons is considered as good as closed.

Old Material.—The feature of the past week has been the large sales of heavy melting steel scrap, at full prices. There has been a fairly good demand for all other kinds of old material as well. While we make no change in our quotations, there is not the tendency to advance in them that has been in evidence for weeks past. Approximate prices f. o. b. cars are as follows:

Old iron rails	$20 00 to 22 00
Old steel rails, long lengths	16 00 to 17 00
Old steel rails, short pieces	15 50 to 16 50
Relaying rails	21 00 to 22 00
Old car wheels	16 00 to 16 50
Old iron car axles	21 00 to 21 50
Old steel car axles	17 00 to 18 00
Heavy melting steel scrap	16 00 to 17 00
No. 1 railroad wrought scrap	19 00 to 21 00
Iron track scrap	17 00 to 18 50
Wrought pipe	13 00 to 14 00
Ordinary light iron	12 00 to 13 00
Cast borings	10 00 to 10 50
Wrought turnings	12 50 to 13 50
No. 1 machinery cast	15 00 to 16 00
Stove plate	12 50 to 13 00

BIRMINGHAM.

BIRMINGHAM, Ala., Jan. 31—While no sale of any consequences has been made by Alabama furnacemen in the past week or ten days, the iron market is strong and the prospects exceedingly bright. There is little pig iron on the yards ready for immediate delivery. The Alabama Consolidated Coal & Iron Co. expects to have its Gadsden furnace in full operation again in the next few days, while the Tennessee Coal, Iron & Railroad Co. is making preparations to blow in its Little Belle furnace at Bessemer. The No. 4 furnace of the Tennessee Company at Bessemer and the Sloss-Sheffield Steel & Iron Co.'s No. 1 furnace in the city here are both doing nicely, these iron makers being started up last week after a thorough repairing. The extensive buying of basic iron by steel manufacturers in the North has had some effect on the foundry iron trade. The cold weather experienced last week did not disturb the iron production to any great extent in the Birmingham district. Many rumors are heard of large orders for iron to be placed shortly in this district, but outside of some inquiring, nothing definite has happened. Considerable attention is now being given by Alabama manufacturers of iron to increasing production. Orders are on hand for a large quantity of iron and the blowing in of furnaces is necessary in the securing of other business. Though the strike of the union miners and mine workers is still on, the supplies of coal and coke are improving and the furnacemen are greatly encouraged over conditions.

Conditions in the steel industry in Alabama are still very active. The Tennessee Coal, Iron & Railroad Co. is getting better results from its steel plant at Ensley than ever before. There is a strong demand for the products of the plant. The Alabama Steel & Wire Co. announces that improvements will be made at its Gadsden steel plant so that the output will be increased and outside demands met. The company is manufacturing enough steel to satisfy the demands of its rod, wire and nail mills at Ensley. Another open-hearth furnace will be added immediately and other work done about the big plant.

President Maben does not deny or affirm statements to the effect that he will recommend to his board of directors at the coming annual meeting, the erection of a big steel plant in the Birmingham district, thereby using a large percentage of the pig iron produced by that company. Mr. Maben is frank, however, in his assertions that the company would do a wise thing in establishing plants which would produce the finished product instead of crude iron. The Sloss-Sheffield Steel & Iron Co. has six furnaces in operation in this district and the shipments of the product are equal to the production. J. W. McQueen, second vice-president and general sales agent for the company, states that the prospects for the pig iron market are bright for months to come. He states that there need be no fears of an overproduction at any time this year.

Many rumors prevail in regard to the Alabama Consolidated Coal & Iron Co. absorbing other interests in this section. Nothing definite can be learned. However, it is reported that Col. T. G. Bush, president of the Alabama company will be at the head of a larger concern shortly under the same name as the present company. It is said also that the company will foster smaller plants for the use of pig iron and other products of this company.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., Jan. 31.

Pig Tin.—On the whole the market has been strong during the past week, especially spot, whose strong position was due to stocks on hand having become considerably depleted and new arrivals much delayed. Prices today, however, receded a little, arrivals being good. London has been fairly active during the week, with prices about £2 higher than a week ago. Today's closings follow: Spot, 29.80c to 29.92½c; February, 29.15c to 29.35c; March, 28.80c to 29.05c; April, 28.80c to 29.00c. London's closings today follow: Spot, £132 7s 6 d; futures, £131. Arrivals at Atlantic ports for January aggregate 4,106 tons, against 2,597 tons for December.

Copper.—It has been a dull and listless market all week. Consumers seem well supplied for the time being and are letting the market take its own course. Prices are unchanged. In London the market has been fairly active, and prices advanced slightly. Today's closings follow: Lake, 15¼c to 15⅜c; electrolytic, 15⅛c to 15¼c; casting, 14⅞c to 15c. London's closings today follow: Spot, £68 1s 3d; futures, £68 5s. Exports for January amounted to 17,633 tons, against 19,533 tons for December.

Lead.—Spot is quiet and unchanged at 4.45 to 4.55c St. Louis is lower at 4.37½c. London declined to £12 15s.

Spelter.—Is both scarce and higher at 6.20c to 6.30c for spot. St. Louis is stronger at 6.05c. London is lower at £24 12s 6d.

Antimony.—Cookson's is steady at 8.75 to 9.00c. Hallett's is firm at 9.00c to 9.12½c. Other grades unchanged at 7.50c to 8.25c.

Quicksilver.—We quote $40 per flask of 75 lb. lots of 100 flasks. London is £7 12s 6d.

Nickel.—Sales are made at 40c to 47c for large lots down to a ton, and at 50c to 60c for small quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Feb. 1.

Weakness dominates the metal market. Buying has been on an exceptionally slender scale. Prices of copper are perhaps more representative of the actual trading basis if reduced ⅛c. from last week's quotations. Lead brings about 1-10c per pound less in car lots and about ¼c per pound more in small lots than the figures given in last week's report. The car lot price of sheet zinc is advanced ½c and the less than car lot price ¼c per pound. Small lots of spelter sell at ¼c below our last report. Revised prices are as follows: Lake copper, in carloads, 15⅜c; in less than carloads, 15⅝c. Casting copper, in carloads, 15¼c; in less than car loads, 15⅜c. Pig tin, carloads, 30c; less than carload lots, 30½c. Spelter is strong at 6c to 6½c for carload lots, and 6½c to 6¾c for smaller lots. Sheet zinc is unchanged at 7¼c for carload lots of 600-lb. casks, and 7½c for less than carload lots. Pig lead, 4.45c for 50-ton lots; 4½c for carload lots, and 5c to 5¼c for less than carload lots. Antimony is 9½c for Cookson's, and 9c for Hallett's in small quantities. Nickel is 45c to 60c, according to amount and deliveries.

Old metals are in fair demand, though prices are not strong. Dealers' quotations are approximately as follows: Copper wire, 13¼c; copper, heavy, 13c; light copper, 12c; red brass, 11⅞c; red brass borings, 10c; yellow brass, 9c; yellow brass borings, 7⅞c. Lead, 4¼c; tea lead, 3.70c. Zinc. 4½c.

Lake Superior Iron Ore Association.

A meeting of representatives of Lake Superior iron mining companies and of selling firms representing such companies was held recently in Cleveland and steps taken to establish a permanent organization on broad lines, its chief object being the gathering and distribution of information of special value to the interests concerned. The organization will be known as the Lake Superior Iron Ore Association. Wm. G. Mather, president of the Cleveland-Cliffs Iron Co., was elected president; E. W. Oglebay, of Oglebay, Norton & Co., vice president and treasurer, and Wm. B. Treat, secretary. The office of the association, which will be at 217 Western Reserve Bldg., will be in charge of Mr. Treat.

The association will pay particular attention to the collection of statistics of iron ore stocks on docks and at mines, of ore shipments from mines during the season of navigation, and of shipments from lower lake docks throughout the year. An important part of its work will be the compilation of exhaustive analyses of the various Lake Superior ores and the distribution of this information among miners, shippers and consumers of ores. The booklet containing such analyses for ores shipped in 1904 as well as expected analyses for 1905, is now about ready for distribution and may be obtained from Secretary Treat.

A meeting was held at Sheffield, Eng., on Jan. 16, attended by iron and steel manufacturers in that district, to prepare for the autumn meeting of the Iron and Steel Institute. It was decided to hold the meeting in the week opening Sept. 24 and preparations are under way for a noteworthy gathering. This will be the first visit of the institute to Sheffield in its 35 years' history. The president-elect, R. A. Hadfield, was active in bringing the institute to his home city.

CANADIAN INDUSTRIAL NEWS.

TORONTO, Can., Jan. 31.—The outlook for the steel market during the coming season is highly encouraging, the principal factor being the heavy demand for steel rails in connection with railroad construction. William Whyte, second vice president of the Canadian Pacific Railway, was in Toronto this week on his return trip to Winnipeg from Montreal, where he had been in consultation with the other officials concerning the requirements of the western section of the road for which appropriations on a very liberal scale have been passed. About $4,000,000 will be expended in improvements including the laying of 500 miles with standard steel rails, the bulk of the orders for which will go to Sault Ste. Marie.

The Grand Trunk Railway has given an order for 25,000 tons of steel rails to the Dominion Iron & Steel Co., the rail plant of which will very shortly be completed and is expected to go into operation by about May 1. It has received several other extensive orders. An important economy is likely to be effected in connection with its operations by the utilization of the slag now a waste product. A company of English capitalists has been formed with a capital of $500,000 who will erect large cement works at Sydney with a capacity of 500 barrels of cement per day and will use the slag as their raw material. They expect to commence operations in May.

At a meeting of the executive council of the Canadian Mfg.'s Association, held on the 19th inst., a resolution was adopted urging the Dominion government to disallow the application made by several manufacturing companies to be allowed to import free of duty certain parts used in the manufacture of railroad cars, etc. The view of the council is that as these lines are now made in Canada the granting of the application would be unfair to established industries.

The Dailey Rotary Engine Co., Ltd., has obtained a charter of incorporation under the laws of Ontario with a capital of $100,000 and head office at Galt. The provisional directors are: Charles Hetherington, Richard W. Roelofson, Andrew J. Oliver, Charles Turnbull, and Frank E. Brown, all of Galt.

At a meeting of the creditors of the Reese-Hammond Fire Brick Co. and allied concerns, held at Pittsburg this week, action was taken looking toward a dissolution of the receivership in the near future. Statements made to the creditors showed that since November, 1903, when the Reese-Hammond plants went into the receiver's hands they have been only partially operated, but nevertheless the net profit was close to $80,000. With a bright business outlook and with careful management it is believed that the affairs of the company can be straightened out within a few years so that the original management can again assume charge. The creditors' committee recommended that steps be taken to have the receivership dissolved, and that the affairs of the company be administered under the supervision of the creditors' committee for the ensuing five years. The creditors in attendance at this meeting hold about 90 percent of the claims and if the remaining creditors sign the agreement the plan will be immediately put in force. The company owns valuable fire brick plants at Bolivar and in Clearfield County, Pa., which will be placed in operation.

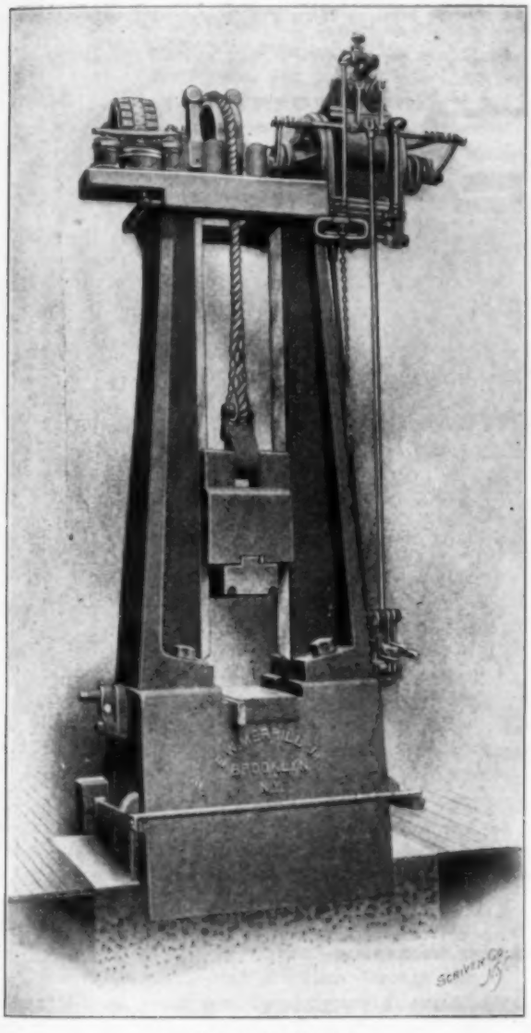
Oglebay, Norton & Co., Cleveland, have published a booklet giving guaranteed analyses for 1905 of their Lake Superior ores, including Yale, Montreal, Lawrence, Ottawa, Ottawa Manganese, Clifford, Foxdale, Bristol and the Bristol manganates.

The L. K. Hirsch Co., of New York and Chicago, has opened an office at 2010 Farmers Bank Building, Pittsburg, M. K. Frank being the resident manager. The company deals in pig iron warrants and iron and steel.

AN IMPROVED DROP HAMMER.

The improvements in the semi-rotary steam or compressed air drop hammer here shown are noiseless operation, lifter conveniently located over any drop hammer, height of automatic trip quickly changed, and greater ease of operation. Dispensing with the holdup latch hitherto used, eliminates shock upon the working parts with consequent wear. The only perceptible sound is that caused by the faces of the dies when striking.

In place of the latch fastened to the upright and holding the hammer at different heights, there is now a brake secured to the lifting shaft. This brake works in conjunction with the main valve operating the lifter, and the instant the part rotating the lifting shaft stops, the brake is automatically applied,



STEAM DROP HAMMER.

and clamps the lifting shaft in any position at which it should stop with the hammer suspended.

A small controlling valve is connected to the treadle by means of a light chain or rod and operates the holdup brake.

On depressing the treadle the hammer will deliver a succession of blows until the foot is removed. A single blow is equally practicable. When the treadle is but slightly depressed a gentle stroke will be produced.

Should the supply of steam or compressed air be turned off, the hammer cannot fall though the treadle be depressed. This is owing to the fact that the steam or air pressure must first operate the brake controlling valve.

These lifters can be placed over any style drop hammer because the entire operating mechanism is on the one bed plate.

They can be constructed to raise the hammer as high as eight feet, at the same time adjustable to any intermediate height of fall, and with a drop as low as six inches. Changing to trip automatically at any desired height between the lowest and highest range of fall, requires but a few turns on a small turnbuckle, a fraction of a minute process. It is possible to make the adjustment in height of fall while the hammer is in operation.

The speed of blows depends upon the steam or air pressure. Under ordinary conditions, the strokes are at the rate of 100 blows per minute with a 1-ft. fall, 75 blows with a 2-ft. fall, 60 blows with a 3-ft. fall, and greater falls at proportionate speeds.

In setting dies, the hammer can be lowered and held permanently suspended anywhere, or gently lowered until the dies meet. When the hammer is held stationary in a raised position, steam is not consumed, as the tension upon the brake gripping the lifting shaft, is applied by two powerful compression springs.

But a slight pressure upon the treadle opens the brake valve and the motive power being steam or compressed air, makes it possible to place the machine in any convenient location wherever a supply pipe can be run. By this method of lift it is possible to successfully handle very heavy hammers. Forgings weighing 240 lb. each have been formed from the solid by hammers raised in this manner. The hammer delivers a free and heavy blow as there is nothing to retard the fall. The catching of the hammer on the rebound is instantaneous and eliminates all drag and double blow. The machine is made by E. W. Merrill Jr., of Brooklyn, N. Y.

Absorbed by the American Locomotive Co.

The American Locomotive Co., with general offices in New York and plants in Dunkirk, N. Y., Paterson, N. J., Scranton, Pa., Manchester, N. H., Allegheny, Pa., Providence, R. I., Richmond, Va., Schenectady, N. Y., and Montreal, Canada, having an annual capacity of fully 3,000 locomotives, has acquired the Rogers Locomotive Works, Paterson, N. J., which have a capacity of about 300 locomotives per year. The directorate of the Rogers concern was changed and the following new directors, who are members of the executive committee of the American Locomotive Co., were elected: A. J. Pitkin, Pliny Fisk, Wm. M. Barnum, Frederick W. Stevens, George R. Sheldon and J. E. French. The following old directors remain: John W. Griggs, Wm. Barbour, Walter G. Oakman, John Havron and Reuben Wells. John Havron remains president of the Rogers company. A. J. Pitkin is chairman of the board, Leigh Best secretary of the company and C. E. Patterson comptroller.

The present corporation, known as the Rogers Locomotive Works, was organized under the laws of New Jersey in 1901, and acquired the property of the Rogers Locomotive Works, located at Paterson, N. J. The corporation has outstanding $2,000,000 in stock, equally divided between common and preferred. The funded debt is $490,000. The Rogers works were purchased from the Rogers estate several years ago by a group of interests headed by William Barbour of Paterson, and the plant has been considered one of the best in the country. Dividends have been paid on the 6 percent preferred stock regularly, and the common stock has received disbursements of as much as 11 percent in one year.

Operations are being made to blow in the Carp furnace, of the Pioneer Iron Co. at Marquette, Mich. A blowing engine has been moved from the Gladstone plant of this company, where it was replaced by a more powerful engine. Repairs are being made and the stack will be ready for operation about the first of March. Delivery of hard wood for the kilns has already been begun.

A NEW LATHE WITH QUICK CHANGE GEAR.

The new 16-in. quick change gear lathe of the Bradford Machine Tool Co. of Cincinnati, is shown in Fig. 1. The lathe is back geared 9.25 to 1, and has power cross and length feed to the tool rest, with non-interfering reverse in the apron. The spindle is made of hammered crucible steel, accurately ground, as are all the other cylindrical parts, and runs in adjustable taper bronze boxes. The carriage is gibbed complete and all flat surfaces are hand scraped. The rack is made of steel in one section. All small gears and those used in the cluster are steel. Gears of different diameters can be put on the cone of gears to cut special threads or the cluster in gear box can be cut out altogether and the screw driven direct with ordinary change gears. The lathe feeds are 4½ times the threads.

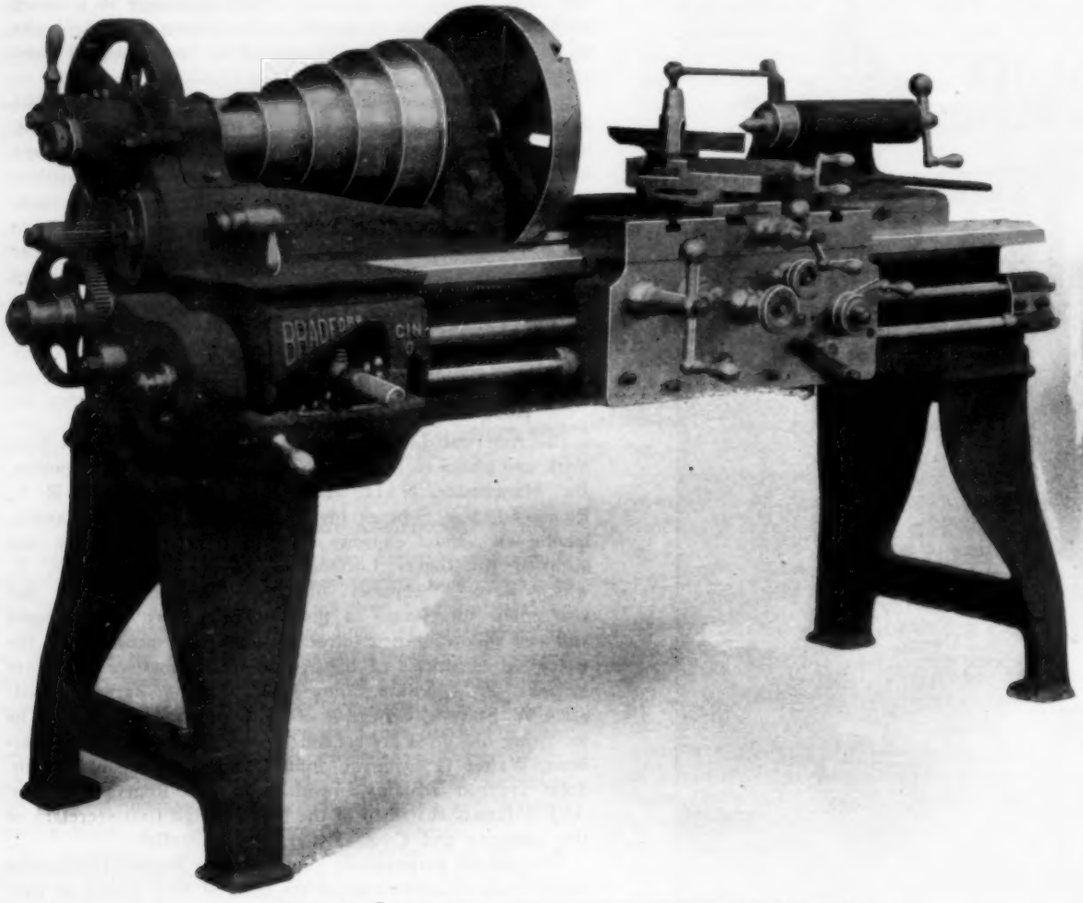


FIG. 1.—A 16-IN. LATHE WITH QUICK CHANGE GEAR MECHANISM.

Figures 2, 3 and 4 present the gear mechanism in detail. The gear box has at A a cluster of eight gears and by a sliding handle the gear at B can be brought into mesh with the different sizes. There are three gears at C on the shaft passing through B and any of these can be fastened to the supporting shaft by a sliding key. They are operated by the gears at D, the intermediate being at E on the quadrant F. The three loose gears on the shaft are fitted with tool steel bushings, hardened and ground. The center gear has a keyway cut through lengthwise and each of the outside gears has a keyway cut on one side only, allowing the knurled knob to be pulled in, out, or center, giving three changes of feed, and as there are eight gears in the cluster in box this would give a range of 24 threads with the knob only. The intermediate gear can mesh with any one of the three gears mentioned, and running loosely on the journal of the lead screw. This therefore gives three times 24 or a totol of 72 changes without removing a gear from the lathe. The driving gear is supported at G. The gear is cut solid with the shaft. The supporting bracket is bolted to the quadrant with the under part cut out to allow the intermediate gear to mesh in the pinion. As the bracket turns with the quadrant the pinion, bracket and intermediate gear will always bear the same relative position and therefore the bracket supports the pinion no matter which one of the three gears is in mesh with the intermediate. The quick change mechanism may be thrown out temporarily and ordinary change gears employed. The knurled knob can be taken off allowing a gear of any size to be put on the lead screw as shown in Fig. 3. This also illustrates the handle and key for fastening any of the loose gears at C to the shaft. The handle controlling the position of gear B is held by the locking scheme seen at H in Fig. 2 and in greater detail in Fig. 4. A recess in a spring operated collar on the handle catches under the heads of the conical screws and holds the gear B in place at any point. These screws can be raised or lowered to allow the gear on frame to mesh correctly in any gear of the set and the manufacturer may therefore use gears other than those ordinarily in demand, by simply making the screw longer or shorter, a change which does not necessitate new patterns for any special thread to be cut on the lathe.

The lathe stop is automatic and of the familiar clutch type, the only difference being that the spring is put on at the rear end of the rod instead of at the front end. The cone of gears is made up of steel drop forgings and the fits are all ground. The principal specifications of the lathe are as follows: Swing over bed 16¼ in.; swing over carriage 10⅜ in.; hole through spindle 1⅛ in.; taper attachment available full distance between centers; turns tapers up to 3½ in. per ft.

METHODS OF FIGURING COSTS.*

BY C. E. BEMENT.

One of the most important subjects of discussion in the manufacturing business today, is cost of product, and the best method of ascertaining that cost. The increased importance of this subject has come from the necessity of knowing just what your article may be sold for and produce a legitimate profit, inasmuch as it is no longer possible to reckon on the large profit of 30 or 40 years ago. For if you fix your price above a legitimate profit, you will lose your trade, and if you fix it below a legitimate profit, you will lose your money. The secondary manufacturer (and by this term I mean one who uses the partially finished product of a primary manufacturer, such as steel bars, manufactured lumber, etc.,)—such a manufacturer finds himself buying all his raw material of trusts and combinations of various kinds, who have practically throttled competition and increased the cost of his raw material; forced him to pay cash for everything and made all his buying more difficult and expensive by numberless petty restrictions. On the other hand, competition has forced him to sell on closer margins, on longer time, and with more liberal guarantees. So, too, his labor through combination and the passing of more liberal laws, demands higher wages and better shop conditions. All these adverse influences force the secondary manufacturer to give more attention to his cost system, and through the knowledge so obtained, to better his method of manufacturing by greater economy in shop management, new and improved, and generally more expensive, machinery, and by the reduction of nonproductive labor to the lowest point.

It is almost impossible to lay down any fixed rule for figuring costs, that will apply to more than one branch of manufacturing. This is the reason that a great deal of writing on this subject has been futile, with the exception of a few generalities which are fairly axiomatic. Every man must work out his own salvation as to his cost figuring, and it sometimes happens that it does not prove to be salvation. Machine shop practice has perhaps more than any other branch of manufacturing been brought into some systematic method of cost keeping, but in the line of manufacturing in which I am interested, the subject is still in a somewhat chaotic condition, as near as I can find out by comparing notes with fellow manufacturers. In shops where a limited number of articles are made, it is a comparatively simple thing to get a shop cost, but in a shop making $1,000,000 worth of goods per annum, and anywhere from five hundred to a thousand different articles, it presents some very difficult problems, not the least of which, may be the necessity for keeping your system simple enough so that it does not take a large corps of experienced men to keep it up.

There are two principal methods of cost figuring. One called the continuous system, in which every piece is figured every time it passes through the shop; the other is the individual system, in which every complete tool or article is figured as a whole without attempting to keep track of every time the parts of that tool are made in the shop. The latter, or individual system, is better adapted to exclusive piece work shops, and is the one employed by me in the establishment with which I am connected. Cost keeping of this kind has several elements: 1. Cost of raw material. 2. Cost of labor directly put upon that raw material, or the productive labor. 3. Cost of the labor not directly out upon that material, but indirectly, in the shape of handling or other manipulations, which does not add to its value or carry it along toward completion, or nonproductive labor. 4.

*Read at the recent meeting of the Michigan Engineering Society at Lansing, Mich. Mr. Bement is vice president and general superintendent of E. Bement's Sons, of Lansing.

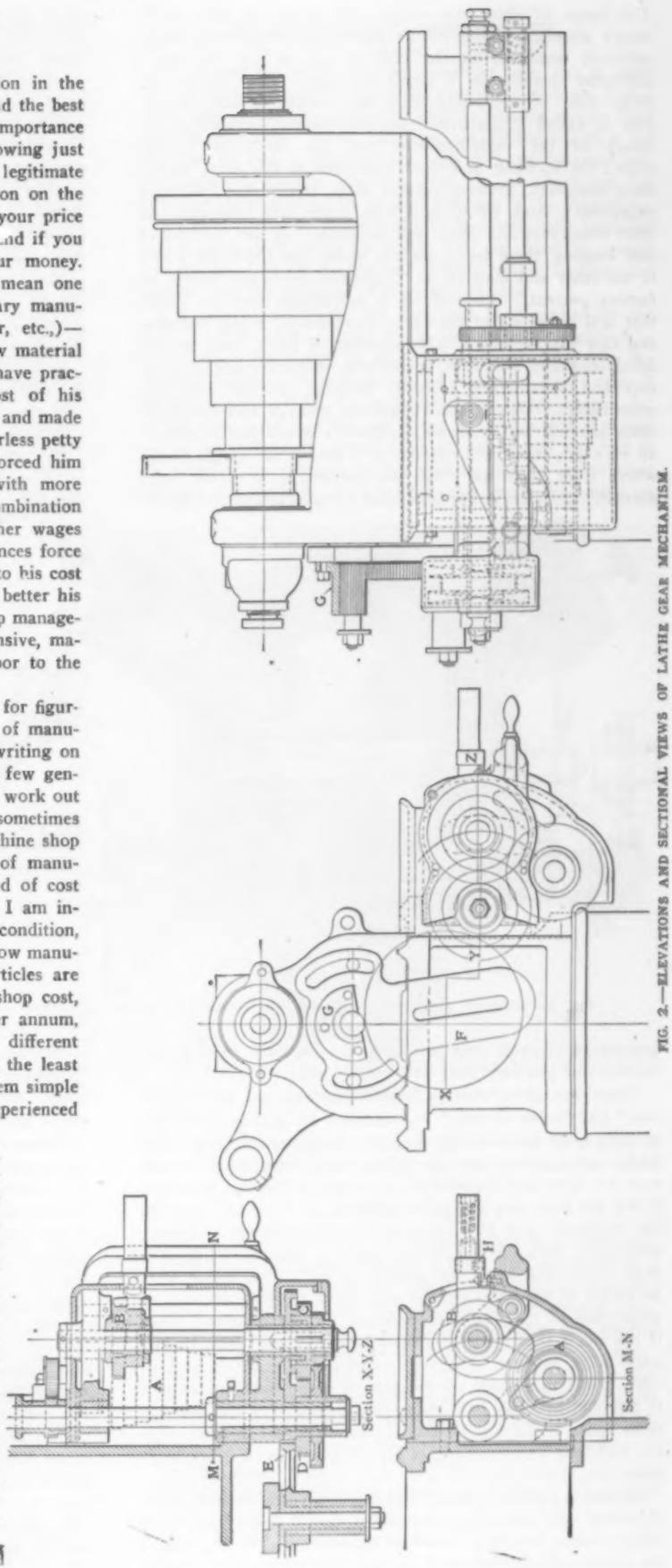


FIG. 2.—ELEVATIONS AND SECTIONAL VIEWS OF LATHE GEAR MECHANISM.

The items of shop cost under such heads as files, drills, emery wheels, and the infinite variety of small items which although negligible in the cost of one article are not a negligible quantity in a year's business. Then comes the large item of secondary shop cost—what in our institution is called "Superintendence and power"—including the salary of the superintendent and his assistants in the office; the foreman and their assistants in the shop, watchmen, engineers, firemen, pattern shop, repair shop, shipping department, stock room, yard help, teams and teamsters and their keep, fuel and light, and so forth. In our method of cost keeping, these items are put under one head and added to the labor and material as "Superintendence and power, or factory percent." Last of all, a percentage must be added that will cover all of the other expenses of doing business, and this will include a large number of items, such as bad debts, insurance and taxes, advertising, stationery and printing, cuts and electrotypes, interest, discount, general expenses, commissions, rebates, and allowances, postage and telegraph, office pay roll and expenses, salesmen's salary and expenses; all of which items will amount to a percentage ranging anywhere from 25 to 40. This last percentage is called "sales percent," and after it has been added you have still to add the

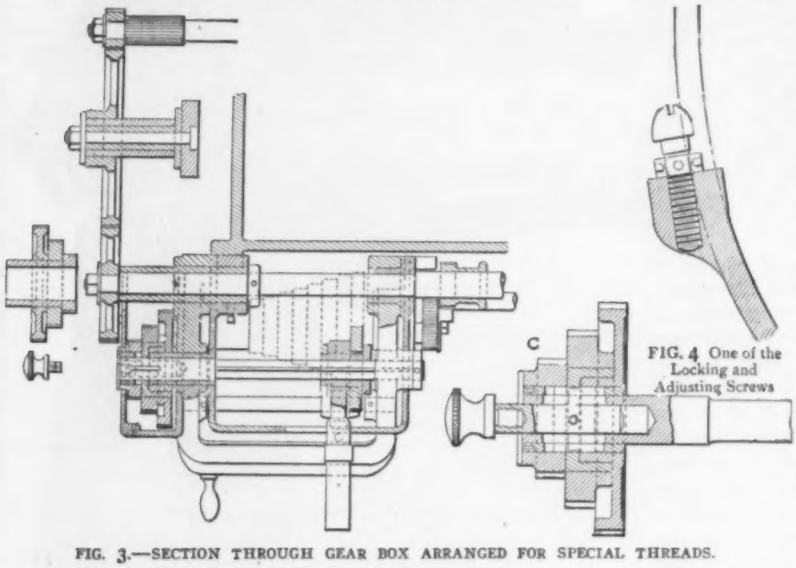


FIG. 3.—SECTION THROUGH GEAR BOX ARRANGED FOR SPECIAL THREADS.

FIG. 4 One of the Locking and Adjusting Screws

percentage of profit that you think the tool will stand in the market, and you have then your selling price.

These two percentages, "Superintendence and power percent" and "sales percent," are obtained by finding what you actually spent for these items in your previous fiscal year, and finding what percent they are of the actual expenditure in that year for labor and material, or to supply a concrete example; If for the year 1904 you spent $200,000 for labor and $300,000 for material, and the items of Superintendence, foremen, watchmen, fuel, etc., as itemized above, amount to $60,000, your "Superintendence and power percent" is 12, which must be added to the shop cost of every tool to make it bear its proportion of the year's expenditure for these items. Then if the items that make up "sales percent," bad debts, insurance, taxes, interest, salesmen's salaries and expenses, and all other items that make up the cost of doing business amount to $200,000, this will be a little over 35 percent of the $560,000 to be added to the cost already obtained in order to have made the tool bear its proportion of all the expenses of doing business.

To give a specific instance, which will perhaps be more valuable than any glittering generalities that I might deal in, I will instance an article which is manufactured by the firm I am connected with and is a familiar farm tool called a gang plow. It contains 240 separate pieces without counting carriage and machine bolts, nuts, washers, spring cotters, etc., of which items there are about 237 pieces. This tool contains common bar steel, cold rolled steel, soft center crucible steel, solid crucible steel, spring steel, sheet steel, malleable iron, cast iron, and rock elm or hickory and yellow pine lumber.

I estimate that the different number of operations figured on this tool is about 1,000. Before the tool is figured, the contract price and raw material used in it must be ascertained, or if there are any articles not under contract for a reasonable length of time, the market price at the time of figuring, and then one of the foundation pieces on the tool is taken as a starting point. If this is steel, it is weighed and the actual weight compared with the theoretical weight to see that no great variation occurs; allowances are made for waste so that the gross weight will be charged to the tool; then the operations on this piece are ascertained, and we will suppose that the first one is cutting to length; this will be a piece work operation at so much per 100 pieces, to which must be added a slight percentage for cost of shears.

The next operation is presumably the punching operation at so much per 100 holes, with a slight percentage added for punches, or for the punchman's work on certain class of work, he pays for the punches and dies, the cost of which are in the piece work price paid him From the punch the article goes to the bulldozer or drop hammer, where it is heated and formed. Piece work for this operation is charged against the article, with an additional known percentage for fuel, derived from the actual consumption by the furnace of oil per diem, meter measure.

This may leave the piece ready to pass to the mounting department, in which case it is taken by a trucker, who represents nonproductive labor, and here comes one of the most difficult items to take care of. The best system we have found for taking care of nonproductive labor, is to find the actual percentage per day of nonproductive labor in each department bears to the productive labor, and add that percentage to the labor on each piece. The percentage of nonproductive labor will vary very greatly in different departments. It will also very greatly according to the amount of work being done in the shop; the greater the output the lower the percentage of nonproductive labor, but in any case it will amount to from 5 to 25 percent of the labor in each department. The better the appliances for handling material, the lower will be the amount of nonproductive labor.

Without boring you to follow the cost of a tool into too great detail, this piece of material with which we started is followed through every operation until it is delivered to the warehouse, and every other piece of this tool must be treated in the same way. When all the parts of the gang plow have been so treated their sum will represent what we call "Shop Cost," namely: all the labor and all the material that has entered into them, with the addition of such items as emery wheels, glue, files, drills, taps, etc. To ascertain the actual cost of the article shipped, we must add the percent before mentioned, namely: "Superintendence and power," and on the top of this the "sales percent," and then the profit we think the tool will stand in the market.

The figuring of this tool may involve the figuring of several other fundamental cost items. For instance, cast iron enters into it to a slight extent, and we must know the cost of melted iron, for the molding being piece work, the cost of molding any particular piece may be readily obtained. The cost of melted iron must contain every item of expenditure in the foundry, beginning with the pig iron and the fuel for melting

it, and extending even to the clay that daubs the cupola and the fuel that dries the ladles. This operation is simplified in most establishments by the fact that the foundry is run as an independent department, and everything that it uses is charged to it. So, too, with the steel wheels that enter into the tool,— they are a product of the wheel department, and are figured as an independent output of that department.

This in a brief and hurried way is the method pursued in establishments of our kind to ascertain the cost of an article in order to fix its selling price and ensure profit. The labor involved, though, can be little appreciated from this brief summary. In the first place, the fluctuations of raw materials must be reckoned with. As an illustration, in the last four or five years, the price of melted cast iron,— that is cast iron ready to pour into the mold, with all expenses figured except the cost of molding, has varied as much as one-half a cent a pound twice in that time, and is now on the way to a third fluctuation that promises to be equally violent. In that time also, steel has gone from 97½c per 100 lb. to $1.79 per 100 lb. and half way back. Lumber has advanced $8 to $10 per thousand, and receded from $2 to $3. All of these fluctuations must be taken into consideration and figured. So, too, every tool is liable to yearly change, and every operation on every piece is liable to change at any time.

I do not feel justified in taking the time to discuss this proposition, the most important question of all, outside of strict shop management, namely, the question of what are called "overhead charges," or those charges which arise outside of the manufacturing department. These have become in these times as much a percentage of the cost of an article sold directly, or nearly iderctly, to the consumer, that they are of all things else, the most serious question for the manufacturers to consider; for, however good the shop management, methods and machinery may be, it must be supplemented by equally good management of the items of expense that begin at the office door.

The Banting Machine & Supply Co., Toledo, O., jobber in farm machinery, general machinery and supplies, has increased its capital stock from $50,000 to $150,000 on account of increased business. Until recently the company had been working Ohio and Indiana, but has now added the entire state of Michigan and has engaged several more traveling salesmen. The company is general agent for the Buffalo Pitts Co. at Buffalo, N. Y., and expects to give most of its attention to the sale of threshing machinery of that company. The company does not intend to build at present. It recently purchased a site along the Lake Shore tracks upon which there are buildings that will meet its present acquirements. It will equip these buildings with the necessary machinery for repairing and rebuilding traction engines.

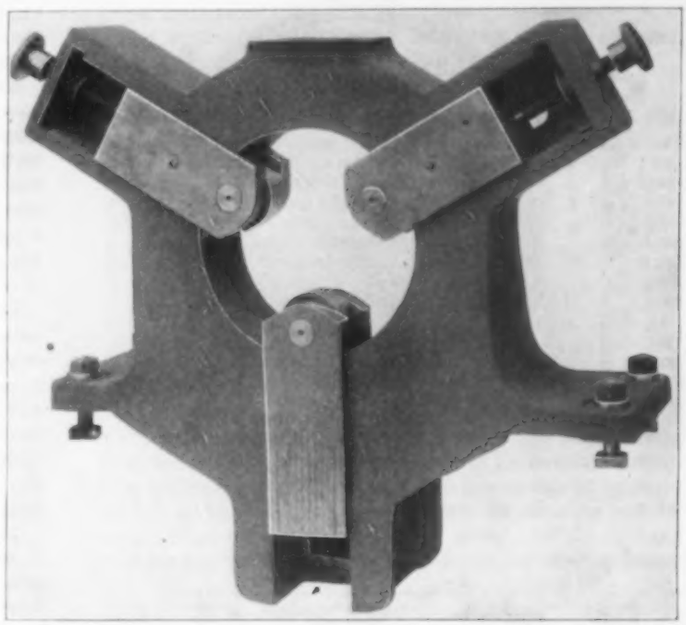
Charles Hudson, receiver of the Omega Steel Co., New Haven, Conn., has made application to the court to dispose of the company's secret process of making steel to a purchaser who has offered $500 for it. This application has aroused much bitterness and the motive of the receiver has been questioned by interested parties. At a recent hearing an attorney who was opposing the granting of the request stated that the secret process constitutes the chief item in the assets of the company and so valuable was it considered, he said, that the receiver originally issued stock to the amount of $3,000,000 on it, alleging it to be worth that amount.

The Wheeling Mfg. & Supply Co., Wheeling, W. Va., has purchased the plant of the Heating, Ventilating & Foundry Co., and not that of the Wheeling Mold & Foundry Co., as was erroneously stated in these columns last week.

HIGH SPEED FOLLOWER REST.

Experience has shown that for roughing bars even as large as 8 in. diameter, some substantial support—a follower rest—is required in order to obtain the greatest possible results from high speed steels. After using several different metals for the jaws of such a follower rest, only to have them cut out, the Lodge & Shipley Machine Tool Co. of Cincinnati, hit upon the roller plan which is clearly shown in the illustration. The rollers are of hardened tool steel mounted upon hardened and ground steel shafts to which they are fixed by screws through the face of the rollers. Liberal oiling facilities are provided for the journals of the roller shafts.

A sensitive adjustment for the jaws is furnished by the knurled knobs of the screws and by this means they cannot be forced down too tightly as might easily be the case with the common screws with wrench-applied pressure. The Lodge & Shipley Machine Tool Co. provides, at an extra charge, for special cases, and tnen the pad at the top of the rest is planed and an angle bracket carried from this point and attached to the wings of the carriage on the opposite side, to insure great stiffness and rigidity. So arranged, the results obtainable on heavy bars from one of the high speed lathes of Lodge & Shipley manufacture are double the results from the same lathe without such a rest.



A NEW FOLLOWER REST.

Articles of association of the Michigan Sprocket Chain Co., of Detroit and Delray, Mich., have been filed, constituting a notification of a change in the organization of the Michigan Sprocket Chain Co., Ltd. The capital of the former company was $25,000, and of the new stock $25,000 has already been paid in. Shareholders of the new institution are: Thomas H. Simpson, George M. Black, E. L. Nelson and L. B. Ball. The company has recently made installation of considerable new machinery, increasing its capacity one-third.

The Parmelee Wrench Co. Inc., Chicago, which succeeds the unincorporated company of the same name, has enlarged its work during the past year so as to meet the growing demand for the Parmelee wrench. It expects that the year 1905 will show an increase of at least 100 percent over 1904, which was a banner year.

Continuous Process for Car Wheel Manufacture.

No branch of the iron and steel industry offers wider possibilities for the production of duplicate parts than the foundry trade, and in the past few years many continuous processes have been tried with more or less success. No steel plant is considered modern today without a continuous mill and it can be safely predicted that in the very near future every specialty foundry will operate on some continuous semi-automatic system. Labor troubles in foundries have fostered the molding machine, and the further replacement of skilled labor by the unskilled and cheapening of labor costs will bring about continuous processes. At Pittsburg a continuous steel belt was tried in one of the largest malleable shops for conveying molds to the casting floor, and practically all continuous processes tried have been designed to prevent the shaking down of molds when taken from one floor to another. The steel belt was discarded as it was impossible to

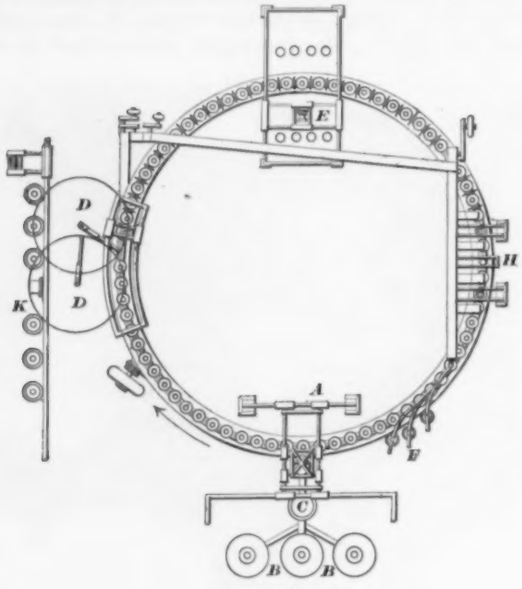


Fig. 1

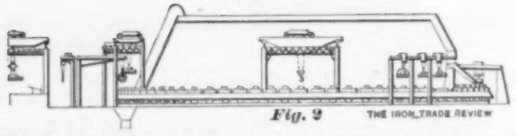


Fig. 2

PLAN AND ELEVATION OF CONTINUOUS CAR WHEEL MOLDING AND CASTING PLANT.

prevent the vibration which resulted in the destruction of an unduly large percentage of molds. At another specialty shop the molds were placed on floats in a large water tank, but the tipping of floats with the consequent destruction of the molds soon resulted in the system being discarded. Outside of the car wheel line, no attempt has been made at operating continuously with a process that combines molding, casting and stripping.

For nearly two years car wheels have been successfully made at a plant near Pittsburg by the Sherman process, the invention of C. W. Sherman, of Bellevue, Allegheny county, Pa. Mr. Sherman's wide experience as a car wheel manufacturer led him to the conclusion that by the installation of a continuous process and a division of the work on each wheel would facilitate the manufacture, better the product, and effect a saving in the labor.

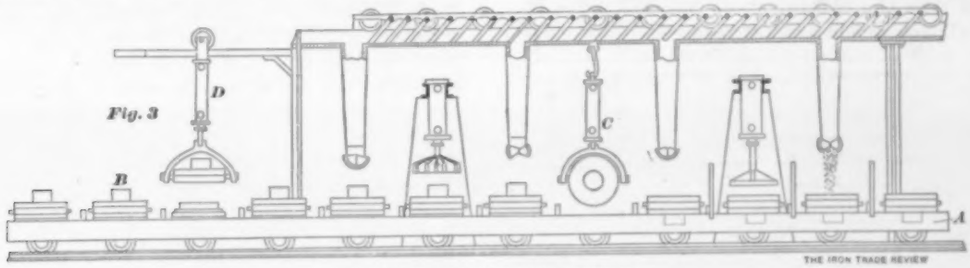
As shown in Fig. 1, the plant consists of an endless track and mold conveyor 100 ft. in diameter with space for 72 car wheel flasks. Each flask is allowed approximately 52 in. of space on the ring. The movement of the conveyor is intermittent and the distance moved is equal to the space occupied by one flask. The molding is accomplished by the use of ten patterns and each pattern is placed in a flask at A shown in Fig. 3, which is an enlarged elevation of the molding section. As the flask moves from point to point sand is fed from overhead spouts at point H in Fig. 1, and each man does that portion of the work assigned to him and this labor is the same on every wheel. When the flask leaves point B, Fig. 3, with the pattern withdrawn the mold is ready to be poured. The coping device is shown at F, Fig. 1. The sand ramming devices shown in Fig. 3 have not yet been used, this work now being done by hand. The pouring is accomplished by the use of a bottom pouring ladle as the mold passes the pouring crane A, Fig. 1, the iron being supplied in the usual manner from cupolas B and ladles C in Fig. 1. The stripping of the wheels is done at a cherry red temperature near the annealing pits, the pits being indicated by K, Fig. 1, the scope of the pouring and stripping cranes being such as to allow the proper time between pouring and stripping each wheel regardless of the speed of molding and melting. The wheel casting is removed with crane D, Fig. 1, from the conveyor car and placed in position for the pit, in one operation. The pitting crane is at G, Fig. 1. As the sand is removed from the wheel it drops into conveyor A, Fig. 4, and is automatically screened, mixed and tempered as shown in Figs. 8 and 9, while being conveyed to the molding section and the empty flask is replaced on the conveyor and passes under crane E, Fig. 1, where it is removed and a cold one placed in position ready for use. About one hour and 45 minutes is required for a flask to make a round of the entire operation and in operating 10 hours a day the same flask can be used twice, thus effecting a saving in a foundry's flask equipment of about one-half.

The track construction on which the conveyor moves consists of 70-lb. T rails curved to the proper radius and resting on ordinary cross ties. Figs. 5 and 6 show an endless conveyor, but the present installation consists of a system of cars, each holding two flasks and made of upright plates A, Fig. 6, and aprons B, of bent plates, forming a protection for the wheels which operate loose on the axles and also the rails at the stripping and molding sections to prevent any loose sand from blocking the track.

The radial axles have the distance from the axle of one car to the axle of the next, the same as between the axles on the same car, and the cars are coupled by a universal device, which will be simplified by the use of a continuous conveyor. Fig. 5 and 6 show a side view and cross section of the conveyor at the operating point. Trolley A, Fig. 5, is so applied to the conveyor as to allow the return movement without engaging the axles. Dog B works against the axle on its forward movement only, and the trippers CC act on the clutch A, Fig. 7, and reverse the movement of the trolley from either direction while the motor runs steadily forward making the movement automatic. The trolley track inside the conveyor track in Fig. 6, extends only the distance of the operating mechanism. The propeller is connected to drums B and C, Fig. 7, by a wire cable shown in Fig. 5, and by referring to Fig. 7 it will be seen that one drum is loose on the shaft while the other is in operation and vice versa. The drums shown are of different sizes to proportion the periods of travel and rest for the main conveyor and allow the proper time between movements for doing the work at various points on the circle. It has been found that a 15-h.p. motor is sufficiently large to move the whole train.

Fig. 3 shows the reciprocating sand conveyor and down spouts for feeding the sand to cope and drag sections of the molds. The gates on the sand spouts operate by a lever. The roll-over hoist C in Fig. 3 is at a convenient point to roll the flask over immediately after the bottom board has been

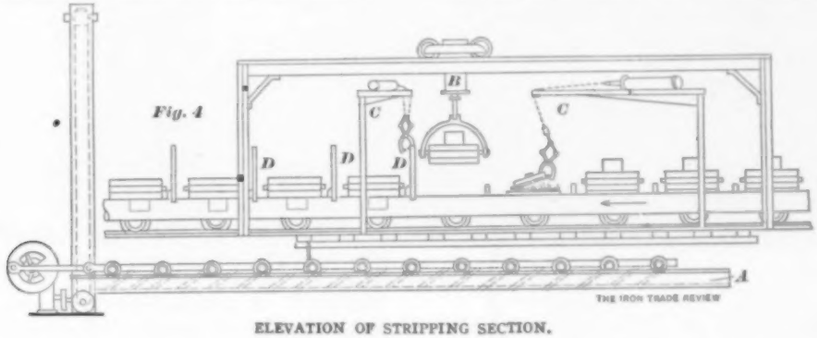
fastened and the coping device D travels in line with the center of the conveyor and leads off the center line in Fig. 1 at F. Fig. 4 shows a pneumatic crane B, which travels in line of the conveyor and the wheel removing cranes C and C. The stripping operation is carried out as follows: Crane B removes the cope, chill and drag from the casting and replaces the flasks on the conveyor in a vacant space ahead, and the wheel is taken from the conveyor by ordinary wheel tongs operated by pneumatic jib crane C and deposited in position for the pitting crane G, Fig. 1. The bottom board is then



ELEVATION OF MOLDING SECTION.

placed in an upright position as at D, and all the remaining sand drops through the cars and open track into conveyor A. The car and grating construction around the stripping section prevents any chunks of iron or scrap from falling through which cannot be easily handled by the conveyor A and removed from the sand by screen A in Figs. 8 and 9. The sand passes along conveyor A, Fig. 4, into screens A, Figs. 8 and 9. This mixer has a system of paddles attached to a shaft for thoroughly mixing the sand while it is being cooled and tempered. The sand is discharged at the opposite end into elevators and conveyors for delivery to the molding section ready for use.

The advantages of the system are many, resulting in uniform molding with comparatively unskilled labor, each man confining himself to one molding operation and an intelligent laborer can be taught his portion of the work very quickly. It has been found by actual operation and in the production of 400 wheels daily the average molding loss is about 2½ percent. All the pouring is done at one point near the mixing ladle, which avoids variations in temperature of the iron poured owing to its conveyance to a distant portion of the shop or near the cupola in an old system shop. The time of stripping all wheels is under the control of the man in charge which in-



ELEVATION OF STRIPPING SECTION.

sures the pitting being done at the proper temperature and the wheels follow each other uniformly, exactly the same time elapsing between the pouring and pitting of every wheel. This is impossible under the old floor system where the wheels are conveyed variable distances before pitting. By this continuous system the heat from the pouring and stripping is entirely removed from the molding section and all wheels are stripped and pitted in the shortest time possible, reduces the loss of heat by radiation, bottles it up in the pit for annealing and avoids roasting the men at the work. A trial of this system through two summers has proved the pouring and stripping to be much easier than under the old floor system and is due to the fact that only one ladle of iron and not more than two wheels are radiating heat in the shop at the same time. Under the old system each molder and helper handles 4½ tons of sand three or four times a day, which is done mechanically by this improved method, the whole operation of handling the sand, molten iron, hot wheels and flasks is reduced to a minimum and Mr. Sherman is now perfecting a molding device to complete the cycle of mechanical operations necessary to the manufacture of machine molded car wheels.

The number of men required to operate a plant equipped as shown in the drawings is as follows:

No. of Men.	Occupation.	Wage Per day.	Total.
1	Painting Chills	$1.25	$ 1.25
12	Sand Rammers	2.50	30.00
4	Finishers	4.50	18.00
1	Clamp Up	2.00	2.00
1	Pourer	3.00	3.00
1	Ladle Attendant	1.50	1.50
6	Shaking Out	1.75	10.50
2	Changing Flasks	1.50	3.00
1	Tempering Sand	2.50	2.50
2	Pitting	2.00	4.00
1	Cupola tender	3.25	3.25
1	Cupola tender helper	2.00	2.00
2	Laborers	1.50	3.00
	Total		$84.00

The above number of men will produce 350 good wheels in 10 hours which makes a total cost of 24 cents per wheel from molding to pitting inclusive and is a saving of 21 cents per wheel from molding with 35 cents for molding and 10 cents additional for foundry labor under the old system. With the application of the molding device for which a patent has been asked, there will be a further saving making the total aggregate 25 cents a wheel.

The 1905 calendar of the Laclede Fire Brick Mfg. Co., of St. Louis, is of striking character and much merit. A special design has been successfully prepared for exhibition of the fire resisting quality of the product, the distance traveled by the output, the territory of the salesmen, etc. These are presented with a testimonial of considerable warmth to the work of the company and its future prospects.

LAKE SUPERIOR CORPORATION.

President Warren of the Lake Superior Corporation in an official statement of the operations of the company since the re-organization says:

"With two exceptions all the plants of the different subsidiary companies are now in operation. Development work

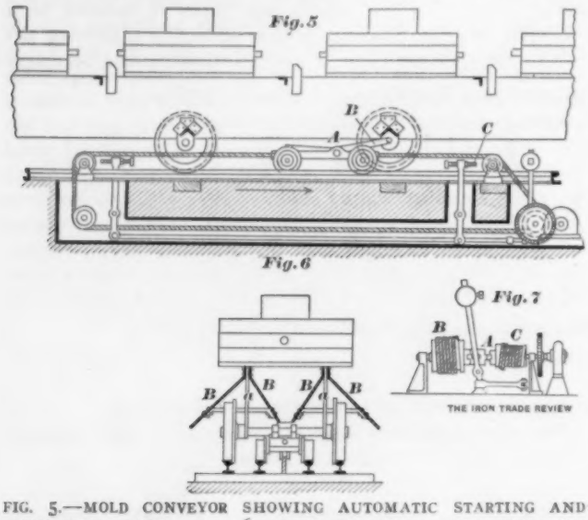
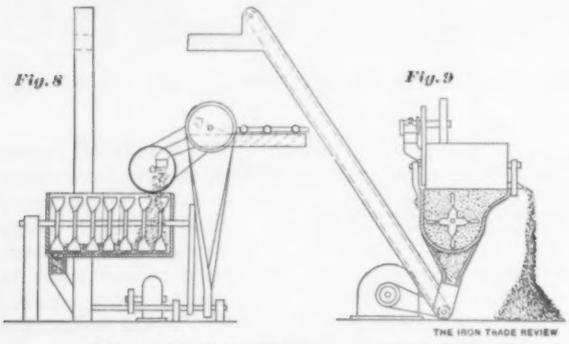


FIG. 5.—MOLD CONVEYOR SHOWING AUTOMATIC STARTING AND STRIPPING DEVICE. FIG. 6.—CROSS SECTION OF MOLD CONVEYOR AND PROPELLING DEVICE. FIG. 7.—DETAIL OF DRIVE AND CLUTCH.

is being carried on at the Gertrude and Elsie nickel mines near Sudbury with satisfactory results. The daily output of the Helen mine since the reorganization has on a number of occasions exceeded 1,000 tons a day, while in the full operating season there was a general average of about 900 tons a day. From now on it is fully expected the average will be 1,000 tons a day. Every pound of ore which will be mined this year has already been sold at a good price, as well as part of the output for 1906. During the present winter the company will take out from the woods from fifteen to twenty million feet of pine, will cut between thirty and forty thousand cords of pulp wood and has already cut 100,000 cords of charcoal wood. The charcoal plant is producing from ten to twelve thousand bushels of charcoal per day, 1,000 gallons of wood alcohol and 12,000 pounds of acetate of lime. The pulp mill is turning out 100 tons a day and both the saw mill and the veneer mill have resumed operations.



CROSS SECTION OF SAND SCREEN AND MIXER.

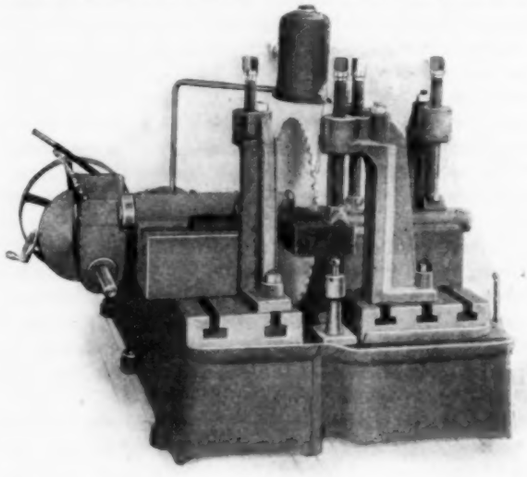
"In connection with the steel rail plant one blast furnace has been in constant operation for several weeks and is turning out between 240 and 250 tons of pig iron a day. The charcoal furnace which will be started this week will bring the annual output of the blast furnaces to 150,000 tons. The steel rail mill consumes more pig iron than the blast furnaces can at present produce but the supply will be supplemented by the blast furnace at Midland in which the company holds an interest. The steel rail mill during the winter months is turning out between 400 and 500 tons and under more favorable conditions between 500 and 600 tons will be reached."

SAWS FOR CRANK SHAFT WORK.

The illustration shows one of the Railway Appliances Co.'s saws adapted for crank shaft work. On this machine the blade is 23½ in. diameter and has a travel of 12 in. The blade is driven by a sprocket meshing with the teeth on the periphery and has a capacity for cutting up to 8 in. rounds after the blade has worn approximately 2 in. in diameter. A cut 12 in. deep can be made in material placed on a level with the axis of the saw blade and by providing suitable V blocks for different sizes of rounds the machine can be adapted for doing quite a variety of crank shaft work.

The table to the right of the saw blade has a lateral adjustment of 9 in. The crank shaft is securely clamped at three points on this table and after making one cut the only change necessary is to loosen the bolt on the left hand stationary table and throw the shaft in or out to the proper distance for the next cut.

This machine should be a useful addition to the equipment of any small forge shop, as it is readily adaptable for other



A NEW CUTTING-OFF SAW.

work than crank shafts. The general construction follows the lines of the Q. and C. Bryant cut-off saw which is also made by the Railway Appliances Co. of Chicago and is strongly proportioned.

The stockholders of the Juniata Steel Co., Greencastle, Ind., at a recent meeting elected directors for the ensuing year, and after discussing the advisability of selling the plant, left the matter in the hands of the directors. It is said that several propositions to buy the plant have recently been made. The directors are: R. L. O'Hair, F. M. Lyons, H. S. Rennick and C. W. Huffman, of Greencastle; W. J. Richards and L. E. Lathrop, of Indianapolis; C. E. Cowgill, of Wabash; and J. W. Lovett, S. J. Mack and R. H. Williams, of Anderson. The sentiment of the stockholders is in favor of disposing of the plant, which as it now stands cost $223,000.

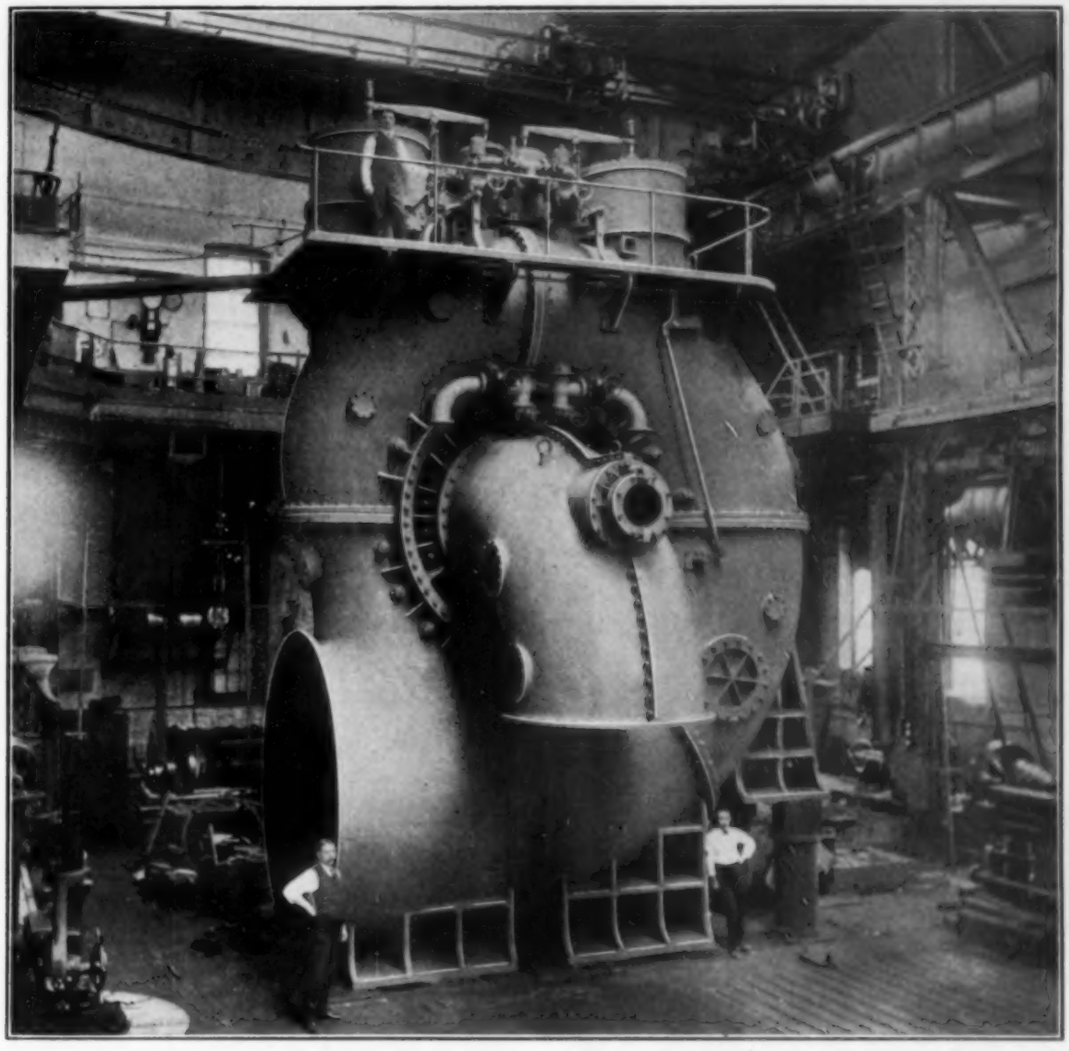
The stockholders of the Bethlehem Steel Co., Bethlehem, Pa., a subsidiary company of the Bethlehem Steel Corporation, have elected the following directors: Edward M. McIlvain, Archibald Johnston, Adolphe E. Borie, Henry S. Snider, all of Bethlehem; Joseph E. Schwab, Max Pam, and Charles M. Schwab, all of New York. The directors elected the following officers: President, Edward M. McIlvain; vice president, Adolphe E. Borie; secretary and treasurer, Henry S. Snyder; general superintendent, Archibald Johnston.

FEATURES OF AN UNUSUAL TURBINE.

The large turbine shown in the illustration was built by the I. P. Morris Co. of Philadelphia, and is now being installed for the Shawinigan Water & Power Co. at Shawinigan Falls, Province of Quebec, Canada. The plant is about 84 miles from Montreal and the water is furnished by the St. Maurice River which flows into the St. Lawrence at Three Rivers. W. M. White, hydraulic engineer at the Port Richmond Iron Works of the I. P. Morris Co., says of the machine here illustrated: "It is the largest turbine in the world. It was completed by the I. P. Morris Co. in the remarkably short time of less than five months. It is 10,500 h. p., is 30 ft. from base to top, 22 ft. wide over all, 27 ft. from center to center of bearings and weighs 364,000 lb. The shaft is of forged steel solid, 32 ft. 3½ in. long, 22 in. in diameter in the center, tapering to 16 in. on the generator side and to 10 in. on the other side. It weighs ten tons. The runner, that is the rotating part, is of bronze and weighs five tons exclusive of the shaft. The wheel proper makes 180 revolutions per minute under a head of water varying from 125 to 135 ft. The quantity of water required for the full development of the power of the turbine is worthy of note, being 395,000 gallons per minute, a more concrete idea of the magnitude of which may be had by stating that it is equal to a river 100 ft. wide, 9 ft. deep, flowing at a rate of 60 ft. per minute."

The intake of the turbine is 10 ft. 6 in. in diameter and the water after passing through this huge opening goes through the runner and is discharged from two draft bends, one on either side. One of these draft bends appears in the half tone. When the machine was shipped it required five flat cars and a box car and a special route had to be selected for its transportation where the bridges were high enough to allow the ponderous pieces to pass underneath.

Shawinigan Falls is an ideal place for water power development. Not only is there available a high head, a large quantity of water and a nearly constant flow, but the river widens into an upper lake just above the falls and after making a right angle bend forms a second lake just below. This bend brings the two water levels within a short distance of each other and thus provides an economical location for the power equipment at the bottom of the slope between them. From the south end of the upper lake a head race canal or forebay, 20 ft. deep and 100 ft. long, was excavated through rock to a point where the ground began to slope rapidly downward 140 ft. within a horizontal distance of 500 ft. Here the canal was closed by a concrete wall 40 ft. high, containing outlets for six penstocks, each 9 ft. in diameter. Provision was made for widening the canal and extending the concrete wall as additional penstocks are required for future development. Three penstocks 450 ft. in length now carry water to a like number of turbine wheels in the power house of the Shawinigan Water & Power Co. and two other penstocks somewhat longer lead to the power plant of the Northern Aluminum



A 10,500-H. P. TURBINE ON THE ERECTING FLOOR.

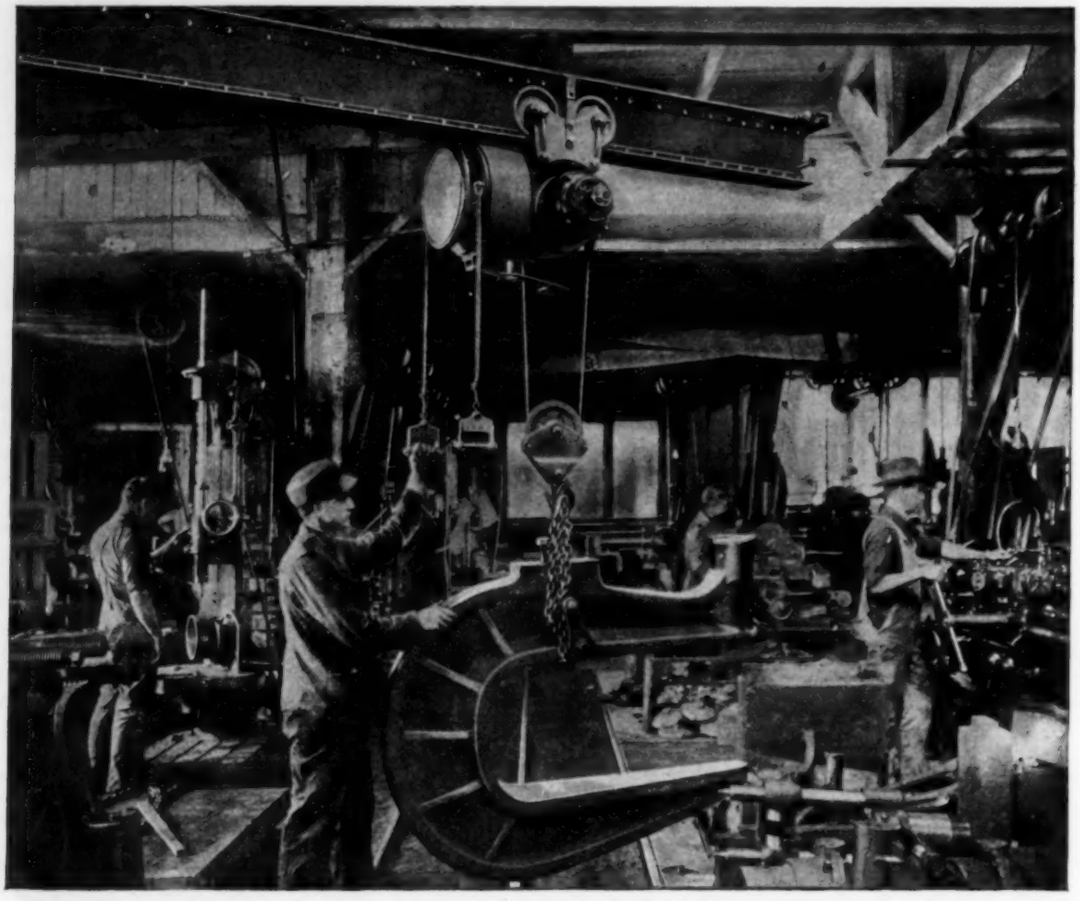
Co., the latter company purchasing its power in hydraulic form and installing its own turbines and generators. Each of the three penstocks first mentioned supplies a 6,000 h. p. horizontal shaft turbine direct connected to a 3,750 k. w. rotating field generator giving a quarter phase, 2,200 volt, 30 cycle current.

The water wheels are of the Francis inflow type with discharge through draft tubes, designed to run at 180 r. p. m. and to provide for a 2½ percent loss in the generators and 15 percent overload. This comparatively slow speed was adopted in order to avoid the necessity for forced lubrication of the bearings. Two of the wheels were designed and built by the I. P. Morris Co. The third was designed and built by Escher-Wyss & Co. of Switzerland. The addition of the larger turbine will increase the power development to 28,500 h. p. The river is capable of furnishing 100,000 h. p. and it is expected that the development will continue as the demand for power increases, the company having purchased considerable property along the river for factory sites, etc. A portion of the power is utilized near the falls in various electrochemical industries, the operation of street railways, etc. About 10,000 h. p. is transmitted to Montreal. The first equipment was not made with any special reference to long distance transmission and the current under contract in Montreal necessitated 60 cycles per second, a condition met by transmitting the 30 cycles and using synchronous motor generators for the conversion to 60 cycles at the receiving end of the line. The current is stepped up at Shawinigan Falls to 50,000 volts, three phase, and carried over the 84 miles by three cables, each composed of seven No. 7 aluminum wires. At Montreal it is stepped down and converted as described, with a transmission loss of about 18 percent. The transformers were designed so that they may be operated at 56,000 volts if desired. A second transmission line to carry another 10,000 h. p. is being built to Montreal and a third is in contemplation.

Large as is the turbine now under way at Shawinigan Falls, the I. P. Morris Co. is building even larger ones of 13,000 h. p. for the Electrical Development Co. of Ontario, Ltd.

A NEW ELECTRIC HOIST.

The General Pneumatic Tool Co. of Montour Falls, N. Y., has an electric hoist among its recent productions. This hoist is identical in general design with the pneumatic hoist of the same make, with but slight changes in detail to adapt it for electric power. The first cost is somewhat greater, but this is met by the increased economy. The Shepard electric hoist is differently constructed from the common type and is especially convenient for such intermittent or minor operations as the service of machine tools, lifting copes, setting cores, etc. The speed control is adequate for accurate manipulation and the head room required is so small that the machine is well adapted for location under galleries, beneath belts, or in low rooms where a less compact hoist would be impracticable.



A NEW ELECTRIC HOIST IN THE MACHINE SHOP.

The hoist is compactly combined in a simple self-contained unit as appears in the engraving. All the running parts are fully enclosed and thus protected from injury—a matter of some consequence for machine shop employment and in the limited quarters seen in the illustration. The several points of interest may be taken up for consideration as follows: The motor is series wound, reversible and multipolar in all sizes. It is thoroughly enclosed and may be used out of doors or in a dusty atmosphere without injury. The commutator and

brushes are accessible and are visible at all times through mica windows. The simple brush mechanism has only two carbon brushes and these securely clamped in position. Flexible metallic leads carry the current, sliding contacts being entirely avoided. The armature and field windings may be removed without disturbing any other part of the hoist.

The controller is enclosed in a separate case entirely independent of the hoist proper and may be removed bodily or opened for inspection without disturbance of any other part. It is arranged for wide speed control and any load from the lightest to the full capacity of the hoist can be moved gently or at any desired velocity. The contact segments are fully protected but visible at all times. Each contact has an independent magnetic blow out for prevention of arcing. The controller is reversible and gives equal speed in lowering or hoisting. Ordinarily the controller is on the hoist but may be mounted in any convenient stationary position and operated by ropes or hand lever. All wires leading from trolley brushes to controller and motor are carried on porcelain insulators and are not in contact with the metal parts of the hoist.

An automatic stop prevents over-running, the controller lever automatically taking the "off position" when the load hook reaches its upper limit. The stop interferes in no way with the free use of the controller, and the load may be lowered in the usual way after it has been checked by the stop. The latter acts directly upon the lower block and cannot be put out of adjustment by stretching of the cable.

The gearing is a double train of machine-cut spur gears in a sealed case and submerged in oil. When the cover of the gear case is removed, the gearing can be easily lifted out without disturbing any other portion of the hoist. Replacing the cover secures these parts ready for service. There are no pins or keys, setscrews or nuts in the way.

Suspension of the load is by one or two parts of cast steel wire cable according to the load. The cable winds directly upon a spirally grooved drum without over-lapping. It may be inserted in a hoist, or removed without disturbing the other parts. Chain may be substituted for the wire rope, although the use of wire rope is recommended by the makers. A mechanical brake prevents the load from running down when the motor is at rest. It interposes no resistance to hoisting, but holds the load securely in any position. The brake can be released only by reversing the motor and will immediately set again should the load descend at a speed slightly greater than that corresponding to the speed of the motor. No current is consumed in lowering aside from the very small amount necessary to rotate the motor under no load. The friction surfaces of the brake are submerged in oil, which lubricates them uniformly and also rapidly conducts away any heat generated. An electric brake is applied directly to the armature shaft, is always set at full power unless held off by current flowing through the motor, and serves to bring the motor quickly to rest when current is cut off.

The trolley is made in a variety of forms adapted to every class of service. It has roller bearing wheels with chilled spherical treads. When desired, it is furnished with pendent hand chains or an electric motor for the travel movement. A small amount of head room is consumed by the hoist and trolley.

The hoist is manufactured in six sizes up to 20,000 lb. capacity, one motor type with single I-beam trolley, and guaranteed for occasional overloads of 25 percent. The two motor type with traveling cage is in four sizes from 1,000 to 10,000 lb. and plain jib crane and derrick forms are also manufactured.

The Jeffrey Mfg. Co., Columbus, O., has purchased the plant of the Ohio Malleable Iron Co. of that city. The Jeffrey company has for some time been a large holder of stock of the Malleable company.

BETHLEHEM STEEL CORPORATION.

The newly created Bethlehem Steel corporation has apportioned to the several interests the stocks and bonds provided for in the reorganization plan. The company's $15,000,000 of preferred and $15,000,000 of common stock and $3,000,000 of 6 percent bonds has been distributed as follows:

1—New collateral trust bonds:

(a) To assenting holders of Bethlehem collateral bonds on terms heretofore published	$ 1,500,000
(b) To assenting holders of Ship Building first mortgage bonds	1,500,000
Total	$ 3,000,000

2—New preferred stock:

(a) To holders first mortgage bonds	$ 9,000,000
(b) To holders sinking fund bonds	6,000,000
Total	$15,000,000

3—New common stock:

(a) To holders first mortgage bonds	$ 6,000,000
(b) To holders sinking fund bonds	9,000,000
Total	$15,000,000

President Charles M. Schwab will start his new company with the lowest fixed charges of any similar organization in the country. The only charge aside from taxes will be as follows:

For interest on the underlying bonds of the Bethlehem Iron Co. and of the bonds of the Bethlehem Steel Co.	$ 512,555
For interest and sinking fund on the bonds of the new company	380,000
Total	$ 892,555

The new bonds, which bear 6 percent interest, are nearly all held by President Schwab and his friends, and the majority of the common and preferred stock is held in the same way. Counting both classes of stock and bonds the Schwab element holds not less than 75 percent of all the securities.

At the request of Government representatives, the Goldschmidt Thermit Co. will present to the National Museum at Washington the St. Louis exhibit of the company with its complete showing of the various applications of aluminothermics. The collection is in three parts. The first consists of large pieces of rare metals, free from carbon, including chromium, manganese, molybdenum, ferro-vanadium and ferro-titanium. In the second group are diagrams and models illustrating the applications Dr. Hans Goldschmidt has developed of his process of utilizing the heat of thermit. The third series contains numerous pieces of finished material, particularly welded girder rails, showing the operations performed by the use of thermit, in joining and fusing iron and steel. There are also models and specimens of the appliances used.

The Berkshire Iron Works, which recently acquired the blast furnaces at Sheridan, Pa., intend to put one of them in blast as soon as it can be made ready. It will make foundry and mill iron. The officers of the company are: President, J. Mitchell Clark; vice president, J. Armstrong Rawlins; secretary and treasurer, Walter T. Stern; manager, S. H. Chauvenet. The New York office is at 45 Wall street, the agents being Naylor & Co.

The Glover Machine Works, Marietta, Ga., will shortly make a shipment of two locomotives to Mexico by way of Mobile. These are said to be the first locomotives made in Georgia to be shipped abroad. The company also makes a specialty of hoisting machinery.

NOTES OF THE JEANESVILLE IRON WORKS.

Several articles have appeared in *The Iron Trade Review* on the plant of the Jeanesville Iron Works at Hazelton, Pa. A few additional details are here given. The equipment is unique in a number of respects. In the first place, the plant is made as nearly fireproof as possible, but for additional protection a sprinkler and fire hose system has been installed, and as the plant is located outside of the fire district there is a large tank in the tower over the cleaning room, between the foundry and the machine shop. All the water for use about the plant is pumped into this tank and flows from there to the works. The plant gives sufficient pressure for fire protection. In the tower below the tank are installed the coils and engines for the hot air heating and ventilating plant—a very unusual location for such apparatus, but in practice is found quite satisfactory.

Blue Print System.

All blue prints connected with construction orders are sent from the drawing room to the shop office. There are five standard sizes of prints and to accommodate these drawers of corresponding size have been provided. The drawers are numbered in series, but a number of blank unnumbered drawers are left at the end of the series for expansion. Each drawer is used for the blue prints of some special class of work and the drawer number as well as the order and pattern numbers appear on the blue print. When any given drawer becomes full, they simply move all the succeeding drawers one space and introduce one of the blank drawers after the drawer which has become full. For instance, if the drawer in question was number 200, the blank drawer would be 200-A. In this way provision is made for the introduction of additional drawers without interference with the regularity of the system.

As the system of manufacture is to a large extent standard, it is possible to systematize and classify the drawings quite closely and this has been accomplished. All the men using drawings return them to the shop office every night, and the boy in charge of the blue prints assorts and distributes them into their proper places. If a man requires the drawing again the next day it is issued to him, but otherwise it naturally gravitates into its appropriate drawer. Provision has been made for checking the drawings, so that if desired the men can be required to give checks for drawings, the same as they do for patterns. The advantages of this system are that any accumulation of duplicate blue prints is avoided, the shop is always kept clear of blue prints, and the number of prints necessary to carry on the work is reduced to a minimum. The saving in prints has been ascertained already to be of surprising proportions, so easily do unsuspected leaks waste and escape attention.

Crane Service.

The plant is equipped throughout with electric traveling cranes, but one of them has been arranged specially for the work which they have to do and this is shown in Fig. 1. Most of the pumps are so arranged that they can be lifted by two slings, and to provide for this a special double-electric crane has been equipped with two trolleys of 15 tons capacity each and having duplicate hoisting drums. A standard gauge railroad track passes across the end of the shop and the pump can be picked up anywhere on the erecting floor, ends raised simultaneously and parallel with track and placed upon a car for shipment with a minimum amount of work and skill.

The arc lights used for lighting the floor are hung from small jib cranes projecting from the walls and can be turned outward for the accommodation of erectors working on the floor. If, however, a traveling crane should come along with a piece of work suspended, it would simply swing the electric light crane back out of the way and pass on down the shop without injury to the light.

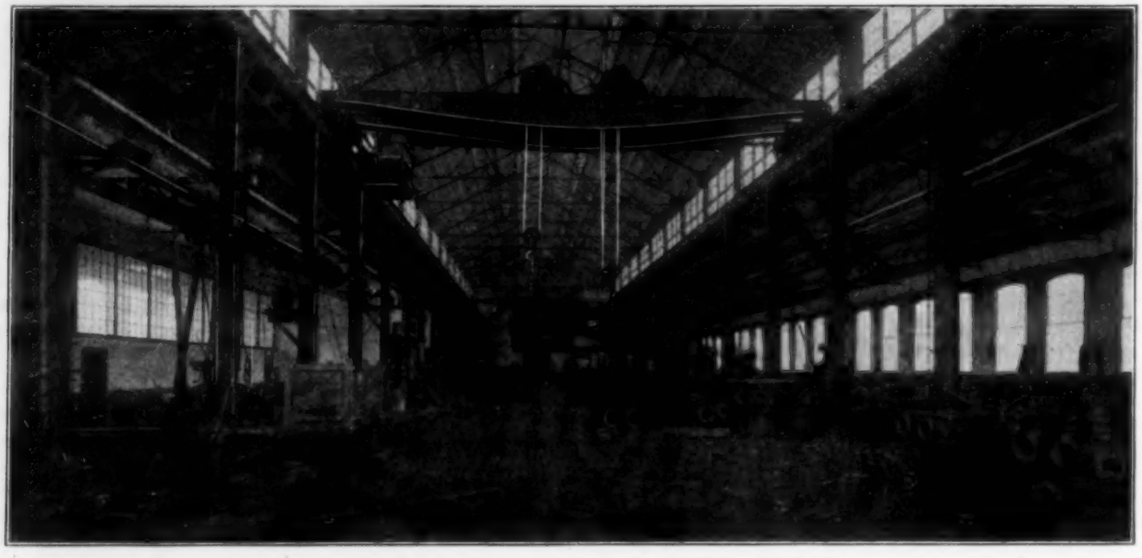


FIG. 1.—MAIN BAY OF ERECTING DEPARTMENT.

Blacksmith Shop.

Ordinarily a blacksmith shop is considered a dirty, dusty place, but in the Jeanesville Iron Works the blacksmith shop is in one side bay opposite the erecting floor and visitors are very surprised to notice what a neat place it is, and also to observe that it makes no dust or dirt for the balance of the plant. This department is shown in Fig. 2. The forges are of the down draft pattern made by the Buffalo Forge Co., but are provided with extra large hoods for receiving the products of combustion. There are two fans, one furnishing blast for the forges and the other acting as an exhaust for removing the smoke. Both of these are driven by one motor.

The Southern Supply & Machinery Dealers' Association will hold its annual convention in Savannah, Ga., April 26, 27 and 28.

Officials of the United States Steel Corporation state that the report that the corporation would absorb the Midvale Steel Co. is incorrect.

GERMAN VIEW OF AMERICAN INDUSTRY.

United States Consul General Frank H. Mason, writing from Berlin, gives an interesting resume of the public expressions of German engineers and manufacturers concerning American industries, these being based on observations made in visits to this country in the summer of 1904. Mr. Mason's report is as follows:

The throng of German engineers, machanics scientists, educators, merchants and manufacturers who went to America during the past summer, not only to see the Louisiana Purchase Exposition, but to travel over the United States and examine with expert intelligence the details of American railway management, and our agricultural and industrial methods, are now returning and relating to their neighbors and colleagues what they have seen. One can hardly take up a German newspaper without finding a more or less extended report of what some one of these clever observers had found and learned in the United States, and has related to his verein or local chamber of commerce, with his comments and conclusions as to what it all means to Germany. It has been no mere pleasure trip to these thoughtful gentlemen, but an earnest, serious effort to learn everything possible of the real productive and commercial strength of our country, and what Germany will have to meet and compete with in the future struggle for a growing share in the world's trade.

It is quite worthy of note that the general tone of these reports is distinctly reassuring to the hearers before whom they have been delivered. While admitting freely the boundless resources of our country, the energy, industry and unsurpassed mechanical skill of the people, the superiority of our factory system, the speed and cheapness of rail transportation, and the restless, progressive spirit which is always looking for a new and better machine or method than the one already in use, the German experts find, or think they have found, defects in many parts of the American system, which unless reformed will continue to weaken our country's grasp upon international trade and promote the interests of competing nations. Without necessarily concurring in these criticisms, it may be of timely interest to hear and consider briefly what they are.

There has been noticed, to begin with, on the part of our people a general feeling of complacent satisfaction with everything American, a secure conviction that whatever is done or produced by them is the best, and that they have only to keep on as they begun to have the future securely in their hands. There is, say these critics, a pervading ignorance and indifference about everything outside the United States that, from the German standpoint, will be, unless corrected, a serious handicap in our quest for foreign trade. The careless confidence with which agents and salesmen are sent abroad, with no special preparation and with no knowledge of any language but their own to do business in countries where only a trifling percentage of the population understand English, strikes these careful, methodical European experts as amazing. The meagerness of technical education, the trifling annual contingent of chemists, engineers, educated dyers, weavers and electricians, as compared with the throng of lawyers, physicians, dentists and unspecialized graduates turned out by our colleges and universities, seems to them shortsighted and improvident. The high standing and excellence of a half dozen great technical schools in the United States are frankly conceded; but what are these in a country of eighty millions of people in which practically every student is destined for an active and useful life?

But most surprising of all appeared to the German visitors the absence of any adequate system of special education for commerce, banking and foreign trade. They consider our so-called commercial colleges, where young men with a district

FIG. 2.—THE BLACKSMITH SHOP.

or grammar school education are rushed through a three-months' course of bookkeeping and commercial usages, as little better than a farce. One of the visitors, a stadtrath and professor of commercial ethics, talked with some of the students of such an institution in one of the Eastern cities, and was surprised at their limited and superficial knowledge, their ignorance of languages, and nearly everything else outside the United States, and their cheerful confidence that their ten weeks at the "college" would equip them for success anywhere. Reduced to simplest terms, these investigators generally conclude that the reliance on a general and more or less superficial education, together with natural adaptability, to fit young men for almost every walk in life, and the lack of specialized study in physical science, modern languages, and the industrial arts, will, if persisted in, neutralize much of the advantage which our country enjoys through natural resources and advantageous geographical position for the South American, Mexican and Asiatic trade. They note also the enormous disparity between American and European wages, the high rates charged by express companies, and the general heavy cost of handling business in the United States, and conclude that on the whole the "American danger" has been greatly exaggerated, and that a steadfast adherence by Germany to the educational system and commercial methods now in practice will leave the Fatherland little to fear in future competition with American manufactured goods.

In just what degree these observations are correct, and the resultant conclusions logical and justified, it is not the purpose of this report to inquire. Inevitably, the observations which have been here roughly summarized were made from the German standpoint by men who might naturally overlook or misunderstand much that did not conform to their theories and traditions. But the fact that such conclusions have been declared by trained observers, after several months of close observation, may well suggest the reflection whether some points in their criticism should not be taken into account.

Certainly it should not continue to be truly said of our people that their most dangerous weakness is overconfidence, an undue reliance in their own skill, and the innate superiority of everything American, and their consequent unwillingness to adapt their goods to the wants of foreign consumers, or make the systematic effort which other nations have found necessary to build up and maintain a prosperous export trade. That this danger really exists does not rest upon the testimony of the German visitors alone.

An eminent English technician who recently visited the United States was impressed with the lack of scientific knowledge on the part of foremen and high-class operatives and the indifference on the part of their employers to the latest and highest perfections in machinery. The latter portion of this criticism is confirmed by various Americans who are engaged in supplying new labor-saving machines to Great Britain and Germany, and who find that progressive foreign firms in the metal industries are more enterprising than their American rivals in adopting up-to-date labor-saving equipment of American origin. Germany and Great Britain afford especially good markets for American machinery of the best types. Not only this, but the labor conditions abroad seem to favor the use of such perfected machinery. This opens up the latest and most important fact in the whole situation, which is that the conditions of labor, especially in the metal industries, are rapidly changing—have, indeed, changed in England and Germany since the great machinists' strike in Great Britain and since the Germans have learned that it is against America, not Europe, that their industrial strength must in future be measured.

An incident which illustrates this is related by a leading American manufacturer of machine tools and has been published on both sides of the Atlantic. The manager of a large machine shop in Berlin was about to order a new machine tool, and sent to an American factory sample pieces to be worked by it in order to ascertain precisely the time that would be saved and how well the work would be performed. The pieces were worked out and returned, with a report of the time occupied by each operation. Among others, a piece had been roughed out to the required size by an engine lathe in seven minutes. Shartly after, the American manufacturer visited the Berlin shop and was shown the written tag affixed to the piece and was told that it was absurd—that the lathe work would require at least an hour. He then offered to demonstrate that it could be done in seven minutes, the engine lathe having meanwhile arrived and having been set up ready for work. But the German foreman said "No, that is unnecessary; if the Americans can do it in seven minutes, we can." Two days later the foreman reported that under his supervision the lathe had done the work in five minutes."

The story is pertinent only as a proof and illustration of how German shops are being supplied with the very latest and most highly perfected machinery, and how German workmen have been taught to take the American rate of production as the standard and to work up to or even beyond it. Realizing that the future prosperity of German manufacturers will depend, as now, largely on their export trade, and consequently their ability to compete with those of America, German workmen of the better class have come to the conclusion that their best interest is to be as efficient and productive as possible. There is a new and pervading ambition to beat the foreigner wherever possible at his own game and with his own tools. When it is remembered that this highly educated, efficient and ambitious labor costs the employer only from one-third to one-half the wages that are paid in the United States and that it is comparatively tractable and easily managed, it will be seen that a situation is being developed here which our countrymen will do well to take into account.

In no other country is banking capital so largely, so skillfully and so effectively used to develop and sustain manufacturing industries and to market their products in foreign countries as in Germany. A large, enterprising and steadily growing merchant marine carries the products of German industry to every part of the inhabited globe. The united influences of the Government, the powerful sale and trade syndicates, and of the capitalists who found banks and finance railways in new countries, are all intelligently and systematically exerted to give Germany a front place in the list of exporting nations.

As Germany has been clever and enterprising in adopting and making the best use of improved methods and machinery from abroad, so the nations which, like our own, must meet this competition in the world's markets, will find it needful to imitate her methods in much that relates to thoroughness in specialized education, in the art of adapting and selling goods to alien peoples, and to high service in everything that pertains to the development and maintenance of foreign trade.

The Peteler Portable Railway Mfg. Co., Minneapolis, Minn., announces that it has disposed of its business and property to the Kilgore-Peteler Co., who assumed control on Jan. 1. The new company also absorbs the Kilgore Machine Co., manufacturer of the Kilgore Steam shovel and saw mill machinery. Francis Peteler, the founder of the dump car business, retires at an advanced age, having established the company in 1870. Philip Peteler and Chas. B. Peteler will continue with the new company and will give their personal attention to the manufacture of cars.

The National Tube Co. is making an effort to get some of its tube mills at Lorain, O., ready to operate by the middle of February. The skelp mills are practically completed and fires have been burning in the furnaces for several weeks to dry them out. The policy of the company will be to start the mills one at a time. The entire plant will probably not be in operation before midsummer.

MOLD DRYING METHOD FOR STEEL CASTINGS.

Forgings are gradually being replaced by cast steel in the construction of locomotive frames not only account of the lower cost of the steel but because the steel suitable for frames shows a tensile strength of about 75,000 lb. per square inch as compared with 53,000 to 54,000 lb. per sq. in. for the best hammered iron. In addition the cast steel frame is practically homogeneous, having no welds, and is of uniform texture throughtout its entire length. Furthermore, the number of projections required for the reception of brake work, tumbling shafts, rocker pins, etc., seriously complicates the production of the frames of hammered iron, whereas the reverse is true in the manufacture of cast steel frames.

Owing to the length of the frames, varying up to nearly 40 feet, considerable difficulty has been experienced among steel casting manufacturers in producing them without shrinkage cracks and the consequent loss of an unduly high percentage of castings. C. C. Smith of the Union Steel Casting Co., Pittsburg, has a patented method of drying molds in his plant by which this difficulty has been entirely overcome. The common practice of drying the molds throughout is objectionable in the manufacture of large steel castings, not only on account of the danger of injuring the mold in its removal to the drying oven but also because the baked mold does not break or disintegrate under the shrinkage of the casting, and as a result the latter becomes strained and frequently full of shrinkage cracks. By the new method only the face of the molds is baked, leaving the main body easily friable, so that the mold will readily break down under the strains due to the shrinkage of the casting.

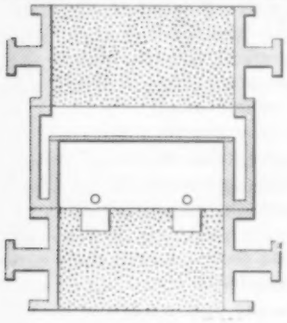


FIG. 1.—METHOD OF PLACING COPE OVER DRAG.

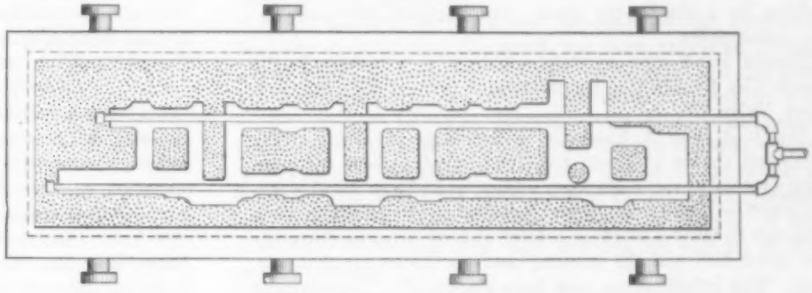


FIG. 2.—PIPING ARRANGED FOR DRYING LOCOMOTIVE FRAME MOLD.

In drying the mold the cope is superimposed on the drag and a perforated gas pipe is introduced between them, the gas being burned in the mold cavity between the cope and the drag. A flask section is placed between the cope and the drag to hold them some distance apart, and to prevent the drying of the cope to a greater extent than the drag a baffle wall of thin metal prevents the flame from coming in contact with the cope face. The heat can be continued for any length of time so as to get thoroughly dry mold faces. While the face of the mold will become dry and hard the greater portion of the mold body will still be moist and will easily disintegrate or break down. In the drying of molds for locomotive frames two perforated gas pipes are used as in Fig. 2. This method of drying can be carried out on the molding floor, not necessitating the removal of the drag or cope to a drying oven, the cope receiving a mininum amount of handling, while the drag is not moved at all. The Union Steel Casting Co. has been successfully making locomotive frames by this method for the past year and a half and is at present producing six daily.

The Pittsburg Meter Co., Pittsburg, has been awarded a contract for 5,000 meters by the city of Pittsburg. The contract price was $51,532.25.

Cincinnati Machinery Market.

CINCINNATI, Jan. 30.—The first month of the year has been productive of more orders for machine tools than was anticipated. It was generally believed that December orders placed for January shipment particularly covered new machinery requirements for the beginning of 1905, and that the taking of inventories and the usual work of this character at the first of the year would have a tendency to curtail new orders in January. In lathes and shapers, however, business has been good. One concern making lathes reports January orders equal to two months of normal production of the plant. Some Japanese and Russian business is included. Manufacturers of milling machines also report good inquiry. In radial drills, while demand and inquiry show a better tendency, the improvement is less marked than in other branches of the trade. Manufacturers of planers report steady demand. Some of the shops are running over time in order to keep up with the pressure of business. Several additions to shop equipment and some enlargment of shops are under consideration.

At the annual dinner of the Cincinnati Industrial Bureau the increasing importance of Cincinnati in the iron and machinery interests was notable. The secretary's report made mention of a new plant in course of erection for the manufacture of steam fire engines, known as the Cincinnati Engine & Pump Co. The fact was also noted that negotiations are under way for the erection of a steel foundry; also the building of a large warehouse by the American Radiator Co., where the company will carry a large stock and distribute from this point. Offices have already been established in this city. The Lackawanna Steel Co. some months ago established a similar agency here, forming a connection with the Cincinnati Iron Store Co., and a large warehouse is now under construction for the handling of products of this company. The machinery interests are well represented in the board of directors of the Industrial Bureau, and Wm. Lodge, of the Lodge & Shipley Machine Tool Co., is prominently mentioned for the presidency of the association for the coming year.

The Oesterlein Machine Tool Co. will soon be able to move into its plant. The building is practically completed and a Greenwald engine installed. The new building adjoins the recently erected plant of the Cincinnati Machine Tool Co., and the two buildings are a handsome addition to the machine tool district.

The new Greenwald engine, Bullock Electric Co. generator and Laidlaw-Dunn-Gordon pump have been installed in the Chamber of Commerce and the new plant is expected to be in full operation by Feb. 1.

The John Steptoe Shaper Co. recently made a shipment of shapers to St. Petersburg, Russia.

The Rahn-Mayer-Carpenter Co. notes a decided improvement in the demand for lathes, and has some shop additions in contemplation.

The American Tool Works Co. held its annual meeting the second week in January. The president's report shows that while the business of the past year was below the normal, still the company paid all fixed charges and added $10,000 to its surplus. A change of location was discussed but it was decided to remain where they are for the present. The officers and directors elected to serve for the ensuing year were: President, Franklin Alter; vice president and general manager, J. B. Doan; secretary and treasurer, Henry Luers; directors, H. H. Peck, A. B. Voorheis, and Robert J. Smith.

Press dispatches state that J. P. Ahrens & Co., of Cincinnati, manufacturers of the Metropolitan fire engines, have withdrawn from the American Engine Co. Mr. Ahrens is credited with the statement that a new company with a capital stock of $100,000 would be incorporated for the purpose of continuing the manufacture of the Metropolitan engines. This project has been under way for some time and ground has been broken at the corner of Cook and Alfred streets for the erection of a new plant which will be known as the Cincinnati Engine & Pump Co. Chas. Fox, Geo. F. Ahrens and Mr. Knapp will be among the incorporators.

The Regal Belting Co., of 906 Freeman avenue, was incorporated during the week with a capital of $25,000.

The Bell-Smith Factory Supplies Co. has been incorporated with a capital stock of $10,000. This concern was formerly the Bell Factory Supplies Co. H. C. Smith, who has been for several years general agent for the Union Pacific Railroad Co., Mary McF Smith and Mr. McFarland are the new partners.

The American Auto Co., of Cincinnati, has been incorporated with a capital stock of $200,000. The new corporation is looking for a site for the plant. The company will manufacture automobiles.

Francis Pund, who recently withdrew as a partner in the Queen City Supply Co., has associated himself with the Williams Valve Co.

The J. A. Fay & Egan Co. will enlarge its plant at the northwest corner of Front and John streets, where the company expects to spend $50,000 in adding to its large wood working machinery building. It was intended by the company some time ago to build a plant on a tract of land between Avondale and Bond Hill and the property was purchased for that purpose. This intention has now been abandoned. The company recently purchased a strip of property 45 ft. wide on the north side of Front street. The company now owns property on both sides of the lot now purchased and will immediately erect a six-story building on the site.

E. C. Seebohm, Southern representative of the J. A. Fay & Egan Co., was presented with a handsome Masonic emblem and a gold watch by the company during the week in recognition of his services.

Lackawanna Steel Co. Bond Issue.

A special meeting of the stockholders of the Lackawanna Steel Co. has been called to consider the proposition to authorize an issue of $30,000,000 first consolidated mortgage 5 per cent bonds. It will be held at West Seneca, N. Y., Feb. 7, and there is no doubt that the bond issue will be authorized. President Clark has issued the following statement regarding the proposed bond issue:

"When arrangements were made some few years ago for the funds necessary for the completion of the company's new plant near Buffalo, provision was made for the future needs of the company by reserving $5,000,000 of its stock and $5,000,000 of its first mortgaged bonds, out of the total issue of $20,000,000 of bonds and $40,000,000 of stock then authorized.

"The company is now in need of about $10,000,000 with which to pay for the completion of its plant, certain new construction and additional property not contemplated when the first mortgage was executed and additional capital found necessary in the development of its business. It is, however, deemed not expedient to issue the stock and bonds held in reserve and the directors have therefore prepared for submission to stockholders a plan to issue the $30,000,000 in bonds to meet the present and future requirements of the company. The first consolidated bonds are to be secured by a mortgage which the directors intend shall cover only the property of the company now covered by its mortgage dated April 1, 1903, subject to the lien thereof; the stock of the Negaunee mine now owned by the company and all other property acquired by the issue of any of the said bonds whether covered by the prior lien of the first mortgage or otherwise, although for practical reasons power is asked to mortgage such of the company's property as the directors may deem expedient."

Newport Foundry Sold to Strikers.

The deal for the purchase of the Newport Foundry & Machine Co., Newport, Ky., by molders who have been on a strike for some time, has been completed, $43,100 being paid for the plant. Negotiations were broken off last Friday afternoon through the interference of President Valentine, of the Molders' Union of North America, and Mr. Weber made arrangements to dismantle the plant and take apart the building, which is of steel construction. After the work of removal had actually begun, the strikers decided to ignore Valentine, and said they would buy the plant regardless of his dictation. They soon came to an agreement with Mr. Weber. Saturday night the non-union men marched out and for the first time since September saw the outside world. The strikers marched into the plant and took possession. Articles of incorporation for the new company have been filed. It has a capital of $40,000, consisting of 160 shares of $250 each. It has 31 stockholders.

The new machine shop erected by the Pittsburg Valve, Foundry & Construction Co., Pittsburg, to replace the shop recently destroyed by fire, has been fully completed and is in operation, the company having entirely recovered from the effects of their recent fire. A three-story office building has also been erected where the offices have been centralized. These offices are located at the works, 26th street and A. V. R. R., the offices on 5th street and Duquesne Way having been abandoned.

The twenty-fifth anniversary of the Engineers' Society of Western Pennsylvania was celebrated at a banquet in the Hotel Schenley, Pittsburg, Saturday, Jan. 28. More than 300 members attended and the growth of the society was recounted by some of its charter members. Dr. A. E. Frost, who has been the society's treasurer since its organization, was presented with a handsome silver service in appreciation of his services.

Hickman, Williams & Co., with offices in Chicago, Pittsburg, Cincinnati, St. Louis and Louisville, have been appointed exclusive sales agents for Salisbury charcoal iron produced by Barnum, Richardson & Co., Lime Rock, Conn. They have also been appointed exclusive sales agents for Muirkirk charcoal iron made at Muirkirk, Md.

Directors of the Page Woven Wire Co. declared a dividend of 2½ percent on preferred stock. The sales of the company for 1904 exceeded $4,000,000 and show an increase over any previous year's business. The company has plants in Monessen, Pa., and Adrian, Mich.

The Algoma Steel Co., Sault Ste Marie, Ont., has closed another contract with the Pere Marquette Railway Co. for 7,000 tons of steel rails. The previous order was for 4,000 tons.

OBITUARY.

Charles White Hubbard, for many years an ax and tool manufacturer of prominence in the Pittsburg district, died at the Allegheny General Hospital, Allegheny, on Friday, Jan. 27. He was born in Thetford, Vt., 78 years ago and located in Pittsburg at the age of 33. He soon became connected with Lippincott & Bakewell, manufacturers of saws and axles. After eight years of service with this concern he formed a partnership with his brother and engaged in the manufacture of saws. The firm was later reorganized and Mr. Hubbard and his brother became partners of Lockart, Frew, Lippincott & Bakewell. This firm built a plant for the manufacture of shovels and axles on 48th street, Pittsburg, and was later destroyed by fire. The firm then purchased the axle factory of Joseph Graft & Co., Beaver Falls, Pa., and about 15 years ago the plant was sold out to the American Ax & Tool Co., and Mr. Hubbard was elected president. About eight years ago he retired from active life and his son, C. W. Jr., was elected his successor. His other son, John Winslow Hubbard, is president of Hubbard & Co., shovel manufacturers, Pittsburg.

Charles Lockhart, president of the Lockhart Iron & Steel Co., Pittsburg, with plant at McKees Rocks, Pa., and one of the largest stockholders of the American Ax & Tool Co., of New York, whose plant is located at Glassport, Pa., died at his home in Pittsburg Thursday, Jan. 26, aged 86 years. He retired from active business several years ago. While his holdings of iron and steel properties were important, he was best known as an oil producer and the foundation of his immense fortune, estimated at about $50,000,000, was made in the oil trade. In 1859 he became an oil producer and in 1874 his refineries were merged with those of the Standard Oil Co. He retained his large holdings in the oil combination and was heavily interested in many Pittsburg enterprises. He is survived by his five children, his wife having died several years ago.

Hugh Caskey, a retired brass and iron founder, died Jan. 17 at his home in Kensington, Philadelphia. He was born in Kensington in 1844, and after serving his apprenticeship in a brass foundry, entered the navy as assistant naval engineer and served through the Civil war. In 1844 he started a brass foundry in Philadelphia, and in 1892 went to Newport News, Va. where he founded the H. & W. Caskey Brass & Iron Works, now consolidated with the Newport News Shipbuilding Co. Five years ago he retired from business. He was one of the original members of the Anti-Cobden Club.

William H. Swift, founder and proprietor of the Boston Bolt Co., Boston, Mass., died Jan. 19 at his home in Brighton, Mass. He was 59 years old.

W. W. Franklin, president of the Columbus Forge & Iron Co., Columbus, O., died Jan. 21, age 71 years. He was an active and wealthy business man and was identified with many leading industries of Columbus and Southern Ohio.

Henry J. Smith, who with his brother founded in 1869 the Brooklyn Iron Works, later known as the Tubal Cain Iron Works, died Jan. 25, at his home in Brooklyn, N. Y., age 69 years.

Charles H. Cady, a well known metallurgist and iron mining expert, died Jan. 29 at Ballston, Spa, N. Y., after several months' illness. He was 69 years of age. Mr. Clay was manager of the mines of Witherbee, Sherman & Co., Mineville, N. Y.

Franklin D. Child died in New York Jan. 12, age 62 years. Mr. Child was born in Boston, and after serving in the Union army became connected with the Hinkley Locomotive Works, at Boston, of which in time he became manager. For the past five years he has been night superintendent of the Baldwin Locomotive Works, in Philadelphia. A friend has said of him that he had the highest type of mechanical ability, including both the inventive faculty, which with a sort of prescience sees how to do things which have never been done before, and also the practical common sense judgment which perceives the means which will be effective in accomplishing the results to be attained.

PERSONAL.

B. D. Quarrie, who has been chemist for the Cleveland Furnace Co., Cleveland, since the plant was placed in operation, has been appointed superintendent, succeeding Alva C. Smith, who resigned to become superintendent of the Riverside furnaces of the National Tube Co. at Wheeling.

I. L. Hughes, chief draughtsman of the Donora, Pa., plant of the Carnegie Steel Co., has been appointed master mechanic of the Ohio works at Youngstown, O.

John Nichol, formerly traveling auditor of the United Gas & Coke Co., has been appointed superintendent of the company's Glassport, Pa., works. The plant was partially destroyed by fire several weeks ago and will be rebuilt under his supervision.

Patrick Mullen, superintendent of the Buffington coke plant of the H. C. Frick Coke Co., Pittsburg, has been appointed general mine inspector of that company and the other coal interests of the United States Steel Corporation.

William Sumner Teall, who has been purchasing agent for the Syracuse branch of the Crucible Steel Co., has resigned to accept a similar position with the newly organized Halcomb Steel Co., of Syracuse.

E. S. Griffiths, secretary and treasurer of the Cleveland Machine & Mfg. Co., Cleveland, has been appointed United States consul to Swansea, Wales. Mr. Griffiths did not seek the appointment and has not yet announced whether he will accept, although he highly appreciates the offer of the president to send him back as consul to the land of his birth. Born in Wales, Mr. Griffith came to the United States while a boy, and after living for some years at Scranton, Pa., located in Cleveland 16 years ago and entered the employ of the Cleveland Machine & Mfg. Co., working his way up to his present position.

C. H. McCullough Jr., who resigned as second vice president of the Illinois Steel Co. to become assistant to the president of the Lackawanna Steel Co., goes this week to the New York offices of the latter company, which will be his headquarters. Mr. McCullough is 36 years of age, a native of Philadelphia. He graduated from Stevens Institute in 1891 and immediately after entered the employ of the Illinois Steel Co. at the South Works, serving in various capacities including night superintendent, assistant general superintendent and general superintendent. He was elected second vice president in May, 1903.

Thomas H. Mathias, roll designer of the South Works of the Illinois Steel Co., has accepted a position with the Lackawanna Steel Co. as assistant to Mr. F. B. Sheldon, and assumed his new duties Feb. 1. Mr. Mathias has been connected with the Illinois Steel Co. since 1885, when he started as an apprentice in the machine shop. He is well known throughout the country as a roll designer.

J. E. Thropp Jr., superintendent of the Donora blast furnaces of the Carnegie Steel Co., formerly night superintendent of the Duquesne blast furnaces, has resigned.

W. O. Mason, Pittsburg manager of the Walters-Wallingford Co., dealer in pig iron, Cincinnati, has resigned to pursue a course of study in the School of Mines, Columbia University, New York.

In equipping its new English shops where the steel cars for the London Underground Railway are to be built, the American Car & Foundry Co. has purchased from the Ingersoll-Sergeant Drill Co. its entire pneumatic equipment including air compressors and Haeseler hammers and drills.

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PIG IRON OUTPUT AT HOME AND ABROAD.

The official statistics of pig iron production in the United States just prepared by the American Iron and Steel Association and presented elsewhere in this issue add another to the comparatively short list of years in which the United States has not broken all records for pig iron production. Since 1864, when the production first reached seven figures, there have been, of a total of 41 years, only 17 in which there was not a record-breaking output, while the most recent year prior to 1904 in which the record was not broken was as far back as 1896. The years 1897 and 1898 were not regarded as particularly prosperous, yet they broke records, the former by a little over 200,000 tons and the latter by over 2,000,000 tons.

On the whole, however, the record for 1904 can hardly be considered bad. The decrease from 18,009,252 tons, in 1903, was only 1,512,219 tons, or 8.4 percent. Ten years ago, when the measuring stick was only half as large, there was a decrease of 2,545,315 tons, while 1894 produced only 6,657,388 tons, against 9,202,703 tons in 1890. The drop in that instance was 27.7 percent, or more than three times the decrease in 1904. It is important to note, also, that in 1894 the previous high record had been made four years earlier, while in 1904 the previous record was made only the year before. Evidence is again furnished of the cyclical character of American iron trade movements, the complete cycle calling for a great depression every 20 years, with a slight depression half way between the great ones.

The American iron trade breaks records with such facility because there is a great general movement towards increased consumption and production, while the production adjusts itself so flexibly to passing needs that when the total for a whole calendar year is taken it generally covers periods alike of depression and recovery. This has been notably the case in the past two years. Had the great slump in production not occurred in the last quarter of 1903, that year would have broken all production records markedly, instead of exceeding 1902 only fractionally. Likewise, had there not been the sharp recovery towards the close of last year the decline would have been much greater. How important is this tendency of the trade to average up for the calendar year can be shown by a glaring instance. It is easy to compute that the production in the twelve-month period ending September 30, 1903, was about 19,100,000 gross tons, and that the production in the following twelve months, ended Sept. 30 last, was 15,300,000 tons, showing a drop of no less than 2,800,000 tons, or 1,300,000 tons more than that which is actually shown by the official statistics, owing purely to the fortuitous circumstance of our calendar year ending with December. The comparison shows not only how great the depression really was, but how short it was.

By the decreased production in 1904 the United States loses materially in its relative importance as a producer of pig iron. The gathering of preliminary returns in the more important foreign countries permits of a fairly close approximation being made to the world's pig iron production in 1904, by which the total may be placed at 44,900,000 gross tons, showing a decline of about 1,125,000 tons from 1903, this being less than the decrease shown by the United States alone. Careful estimates show a reduction in the British make from 8,811,204 tons in 1903 to about 8,400,000 tons in 1904. Nearly all the continental countries are depended upon for more or less important gains. It may be merely a coincidence, but the three English speaking countries, the United States, Great Britain and Canada, all show losses, aggregating approximately 1,939,000 gross tons, while all other countries, with the possible exception of Spain, can be figured upon for increases, making an increase outside of the three English speaking countries of approximately 914,000 tons. These are, of course, only preliminary figures. While the United States loses in prestige in 1904, its proportion nevertheless remains a trifle above what it was until the remarkable spurt made in the present century, as appears from the following table:

	World's pig iron production, gross tons.	United States pig iron production, gross tons.	Proportion of United States. Percent.
1890	27,157,000	9,202,703	33.9
1900	40,088,000	13,789,242	34.4
1902	43,575,000	17,821,307	40.0
1903	46,025,000	18,009,252	39.1
1904	44,900,000	16,497,033	34.5

CONTRASTS IN IRON EXPORTS AND IMPORTS.

The Government statistics of imports and exports of iron and steel for the calendar year 1904, as compiled by the Department of Commerce, show that while imports have steadily declined there has been a large increase in exports. One year ago the statistics of foreign trade indicated that in 1903 exports of articles reported by weight as well as by value had decreased 45,766 tons in 1903 and that imports had decreased

32,521 tons, compared with 1902. During the past year imports have declined 912,182 tons, as compared with 1903, and exports have increased by 815,012 tons. These changes are due in the case of imports very largely to pig iron and crude steel, while in the exports the change is due principally to crude steel and to rails. The detailed table of exports on which tonnage is reported is as follows for December and the calendar year:

EXPORTS OF IRON AND STEEL FROM THE UNITED STATES—GROSS TONS.

	December		12 mos. end'g Dec.	
	1903	1904	1903	1904
Pig iron	5,070	3,141	20,381	49,025
Scrap	2,745	1,561	8,014	20,786
Bar iron	360	2,295	19,380	29,582
Wire rods	1,106	2,028	22,449	20,072
Steel bars	2,722	2,560	17,802	25,89[illegible]
Billets, ingots and blooms	4,065	18,162	5,445	314,324
Hoop, band or scroll iron	200	436	2,140	3,435
Iron rails	38	3	181	1,405
Steel rails	7,592	18,906	30,656	414,845
Iron sheets and plates	140	478	4,782	4,728
Steel sheets and plates	1,499	3,482	13,242	50,475
Tin plates, terne plates and taggers' tin	88	540	292	7,898
Structural material	3,015	5,741	30,041	55,514
Wire	9,959	10,169	108,520	118,578
Cut nails	695	657	8,890	9,273
Wire nails	2,777	4,387	31,497	32,788
Other nails, including tacks	259	359	2,321	3,046
Total	42,259	74,766	326,653	1,141,665

Comparing November and December, 1904, it is found that exports have declined from 121,705 tons to 74,766 tons, or 46,939, of which loss 34,727 is due to decreased exports of steel rails. Only 975 tons of rails went to British North America last December, compared with 26,904 tons in November and 56,960 in October. The new Canadian tariff is responsible for this decline. The total exports of rails for the year to British North America were 216,801 tons.

The only important increase in imports for the year was in tin and terne plates. The tonnage table of imports follows:

IMPORTS OF IRON AND STEEL TO THE UNITED STATES—GROSS TONS.

	December		12 mos. ending Dec.	
	1903	1904	1903	1904
Pig iron	14,719	5,815	599,574	79,500
Scrap	2,545	1,032	82,941	13,461
Bar iron	3,985	2,112	43,225	20,910
Iron and steel rails	2,067	382	96,555	37,776
Hoop, band or scroll	6	190	1,525	2,134
Steel ingots, slabs, billets or bars	1,425	530	261,558	10,801
Sheets and plates	479	158	11,691	4,165
Tin and terne plates	2,490	5,706	47,360	70,680
Wire rods	1,824	1,250	20,536	15,312
Wire and wire articles	479	310	5,018	3,955
Structural shapes	923	220	8,865	1,302
Total	30,951	17,655	1,178,048	265,806

The effect of momentum in business is shown in the following tables of imports and exports for the past seven years. In spite of the prosperity and tremendous demand at home in 1899 and part in 1900, the export movement in pig iron and rails continued during those years and that of billets increased in 1900 about fourfold over 1899 and 1898. Since 1900, the exporting of pig iron has been greatly reduced, the total for the four years being much less than the exports of any one of the three preceding years. The exporting of crude steel was almost entirely stopped in 1902 and 1903 and mounted to 314,324 tons in 1904. Even then, however, the exports of rails were 100,000 tons larger than those of steel. In imports the years 1902 and 1903 are the notable ones, especially in pig iron and billets.

IMPORTS—GROSS TONS.

Years.	Pig Iron.	Billets.	Rails.
1898	25,137	10,656	200
1899	40,372	12,601	2,134
1900	52,565	12,709	1,448
1901	62,930	8,151	2,905
1902	619,354	289,318	63,522
1903	599,574	261,570	95,555
1904	79,500	10,801	37,776

EXPORTS—GROSS TONS.

Years.	Pig Iron.	Billets.	Rails.
1898	253,057	28,600	291,038
1899	228,653	25,605	271,272
1900	286,687	107,385	356,245
1901	81,211	28,614	318,055
1902	27,487	2,409	67,455
1903	20,379	5,445	30,656
1904	49,025	314,324	414,845

The value of iron and steel imports and exports in all iron and steel and manufactures of, not including ore, but including articles of which tonnage is not reported, are shown in the following table for seven years. Owing to advances and declines in prices, the values do not vary in proportion to tonnage. The heavy exports of last year, for example, were at such low prices and were so largely crude materials that the total value did not increase greatly over years of much smaller exportation of raw or half-finished iron and steel, though of larger movement of machinery and of highly finished forms of mill products.

VALUE OF IRON AND STEEL IMPORTS AND EXPORTS IN THE CALENDAR YEARS 1898-1904.

Years.	Imports.	Exports.
1898	$12,473,637	$ 82,771,550
1899	15,800,579	105,689,077
1900	20,443,911	129,633,480
1901	20,394,905	102,534,575
1902	41,468,826	97,892,036
1903	41,255,864	99,135,865
1904	21,621,970	128,553,613

The value of exports of iron and steel products whose tonnage was not reported were as follows for the two years:

	1903.	1904.
Builders' hardware	$12,141,058	$11,176,613
Car wheels	18,966	24,763
Castings	1,765,901	1,372,314
Firearms	1,206,951	1,468,151
Cash registers	1,825,503	1,871,100
Electrical machinery	5,104,502	6,675,766
Metal working machinery	3,316,088	3,483,232
Printing presses	1,143,122	1,450,993
Pumping machinery	2,729,288	2,733,625
Sewing machines	5,340,474	6,019,161
Shoe machinery	834,995	1,240,096
Locomotives	3,099,521	4,697,340
Stationary engines	714,508	1,099,690
Boilers and parts of engines	2,273,834	2,003,323
Typewriters	4,537,306	4,138,651
Woodworking machinery	359,338	628,714
Cutlery	389,837	435,092
Laundry machinery	552,291	512,542
All other machinery	20,068,810	22,918,952
Pipes and fittings	5,919,340	7,303,900
Safes	209,544	242,815
Scales	762,305	608,513
All other manufacturers of iron and steel	9,073,059	10,215,415

The imports and exports of iron ore for the years 1903 and 1904 were as follows in gross tons:

Year.	Imports.	Exports.
1903	$980,440	$80,611
1904	487,613	213,865

The value of iron ore imports was $2,261,008 in 1903 and $1,101,384 in 1904. The value of exports was $255,728 in 1903 and $458,823 in 1904.

The Labor Situation.

UNIONS MUST PAY DAMAGES.

The Supreme Court of Vermont last week overruled all exceptions of the defendants in the suit of the F. R. Patch Mfg. Co., of Rutland, Vt., against the Machinists' Union, of Rutland. This sustains the position of the lower court that the union must pay the company damages to the amount of $2,500 for conspiracy. The case has been contested for two years, the union fighting against the establishment of a precedent making such labor organizations responsible for acts committed in fighting employers. Early in 1903 members of Protection Lodge No. 215, Machinists' Union, of Rutland, went on a strike against the Lincoln Iron Works, of Rutland, which are located within the property of the F. R. Patch Mfg. Co. The usual methods of picketing, urging applicants for work to avoid the place, were followed, and the Patch company brought suit against the union on the ground of a conspiracy to prevent it from employing help and to injure its property. After an exciting trial in the Rutland county court judgment of $2,500 was awarded, which judgment has now been sustained.

VIOLENCE IN STRIKES.

In a recent article in *The Outlook* Slason Thompson presents some statistics in answer to the assertion of John Mitchell, president of the United Mine Workers of America, that strikes can be conducted without violence. Mr. Thompson's statistics show that in the United States, between Jan. 1, 1902, and June 30, 1904, 180 persons were killed, 1,651 injured and 5,533 arrested in connection with violent outbreaks attending strikes. Of the killed 116 were non-union men, 51 union strikers and 13 officers. Of the injured 1,366 were non-union, 151 union strikers and 134 officers. In addition he reports 30 occupied buildings dynamited, 40 trains obstructed and wrecked, four dams and bridges dynamited, scores of houses burned, stoned and shot into. From reports of the National Bureau of Labor he shows that strikes and lockouts, from 1881 to 1900, have cost employes $306,683,227 and employers $142,659,104, and adds "it is estimated that the labor troubles of 1902-3 reduced the purchasing ability of the American people $1,000,000,000."

WILL DEMAND EIGHT-HOUR DAY.

James McMahon, president of the National Association of Blast Furnace Workers, has returned from Buffalo, where he met the officials of his organization. He says the furnace workers will demand an 8-hour day on June 1. The demand of furnace workers will not apply to the stacks operated by the United States Steel Corporation, as the men employed there are not organized on the same basis as the workmen in the independent plants. All of the furnace workers in the independent plants of the Mahoning valley are affiliated with the organization of which Mr. McMahon is the national president.

METAL TRADES ASSOCIATION NOTES.

CINCINNATI, Jan. 31.—Secretary Wuest is mailing a circular letter to members relative to the danger of the passage of the Jenkins anti-injunction bill and suggesting to them the advisability of wiring the members of the Judiciary Committee their protest against its passage. The circular declares that the Jenkins bill is more dangerous than the Grosvenor bill, for which it is intended to be a substitute. This new measure provides that in labor disputes, an injunction shall not be issued, until an opportunity shall have been afforded the adverse party to the proceedings to be heard by the court.

Commissioner Eagan addressed a meeting of the Buffalo Metal Trades Association on the evening of Jan. 30.

The executive committee of the Chicago Metal Trades Association denies the press reports promulgated by the Chicago officers of the International Association of Machinists to the effect that there are several deals pending with the members of the Metal Trades Association to settle the strike which was called last Spring.

Stanley G. Flagg Jr. was elected president of the Metal Manufacturers' Association of Philadelphia at the annual meeting, held January 24th. Arrangements for the annual dinner of this Association were made on January 30th.

John Manley, who for several years was prosecuting attorney of Sioux City, Iowa, and more recently in the auditor's office of Cincinnati, was recently appointed secretary of the Cincinnati Metal Trades Association, and is completing arrangements for the furnishing of his association's new offices which will occupy ground floor apartments in the Odd Fellows' Temple.

There is considerable interest among superintendents in the metal trades in Cincinnati in the formation of a club, which will have for its main object the discussion of technical papers.

Arthur E. Ireland, the newly accredited organizer of the American Federation of Labor, who had charge of the Eastern division of the strike against the Santa Fe, was convicted Jan. 28, at Ft. Madison, Ia., on a charge of assault with a deadly weapon to commit bodily harm.

CINCINNATI DYNAMITER FINED.

A case that grew out of the molders' strike was disposed of in the Criminal Court Jan. 30. It was that of Fred Rauhausen Jr., who was indicted for malicious destruction of property by putting dynamite cartridges in a mold at the Eureka Foundry and destroying a mold worth about $75. Joseph Hollowell was indicted with Rauhausen. The only testimony on which the prosecution had to stand was the confession of the latter to the police and to the grand jury. That was sufficient to convict him and he pleaded guilty, but he refused to testify against Hollowell, who was, therefore, discharged. Rauhausen was fined $100 and given five days in which to pay it.

LABOR NOTES.

Seventeen foundries, fully manned with capable and efficient forces, and every one of the 1,000 a non-union man; peaceful industrial operations; business outlook god and future very promising; unity among employers and generally harmonious conditions. Such is the general situation in Los Angeles, Cal., as shown by the reports presented at the recent annual meeting of the Los Angeles Founders' and Employers' Association. The annual election resulted as follows: President, F. L. Baker; first vice president, Richard Livingston; second vice president, A. S. O'Neil; secretary, S. Luther; treasurer, W. L. Bell; executive committee, D. P. N. Little, W. A. B. Partridge and Gustavus Axelson. The association includes 25 manufacturing concerns and represents all the leading foundry people of Los Angeles. It was organized a year or so ago after the annoying strike of the union workers, and all the shops were made non-union.

The coremakers of the Belle City Malleable Iron Co., Racine, Wis., have gone on a strike because they claim the ventilation of the building where they work is very poor.

John McNeil, grand president of the Brotherhood of Boilermakers and Shipbuilders, has been deposed from his office, after he had made an appeal to the grand council from the action of his local union in Kansas City in suspending him from membership and fining his $100, which action was also sustained. George Dunn, first vice president, of Huntington, Ind., succeeds him. The action resulted from charges preferred by boilermakers of the Union Pacific railroad alleging acts of mismanagement which forced the boilermakers to accept a settlement, which they say has proven to be full of loopholes.

At Trenton, N. J., all the gray iron molders and coremakers struck last week at the shop of the Trenton Malleable Iron Co. The molders in the malleable shop struck some time ago. The latest trouble is a sympathetic strike growing out of the refusal of the company to deduct molders union dues from the wages of one of the workmen.

The National Association of Manufacturers is organizing among its members and other manufacturers, opposition to the new Jenkins anti-injunction bill pending at Washington. The work of this and other organizations was effective last year in preventing the passage of a similar measure at the behest of the labor unions of the country.

A comment was made in this column last week on the labor situation in the St. Louis metal trades, to the effect that the filling of all calls for help filed with the employment bureau in the preceding week indicated a lighter demand for labor. The secretary, J. W. Leigh, writes as to "the inference that we were able to fill all of the vacancies only because the demand was light." "On the contrary the number of unemployed machinists in St. Louis for the past year has been considerably in excess of the demand and we are continually securing employment in other cities for some of our applicants."

Pittsburg daily paper reports that with a change in the management of the Glassport, Pa., plant of the Pittsburg Steel Foundry, Pittsburg, the former employes who went on a strike last summer would be reinstated are emphatically denied by the management. President Stewart Johnston in discussing the reports said that there is no truth in the statements that the foundry would be operated with union men. "You can state," he added, "that our foundry is not even an open shop; it is strictly non-union and will continue to operate as such." Duncan McDougall, who has been superintendent of the foundry, has resigned and has been succeeded by G. A. Hassell. Mr. McDougall's resignation was entirely voluntary.

One hundred coremakers at the Alliance, O., plant of the American Steel Foundries, have gone on a strike. It is understood that the cause is a dispute about the amount of production.

For the Encouragement of Apprentices.

Messrs. Richardson, Westgarth & Co., Ltd., of the Middleton Engine Works, Hartlepool, Eng., have a method of encouraging deserving apprentices which has been on trial with much success for the past two years. It provides for an increase in the weekly wages as each apprentice reaches a certain standard for punctuality, perseverance, ability and good conduct in the shops and for passing examinations at the evening educational classes. The scheme has given great satisfaction and during 1904 the increase in the boys attaining the minimum standard was 27 percent for time-keeping, 31 percent for perseverance and good conduct and 48 percent for passing examinations. It is found that the foremen are also brought into closer association with the boys, as every chief of department has to report on each of his boys every quarter year and there is a constant appreciation of the ability and effort displayed during the whole term of apprenticeship. The report for 1904 shows that the advances in pay range from six pence to one shilling and two pence per boy per week or a total of about £170 for the year. The details of the scheme were arranged by D. B. Morison, managing director, and it has already been adopted in its entirety by many British firms.

"The Mineral Industry" For 1903.

The 1903 volume of "The Mineral Industry," prepared by the editorial staff of the *Engineering and Mining Journal*, has been issued from the office of that paper. Like its eleven predecessors, it is a stout octavo volume, and the pages run up to 527. The plan of the work is substantially that followed in the volumes of other years, and it need not be said that there is compressed into the 500 pages a most valuable summation of the year's progress in metallurgy in all lines. The chapter on "Gold and Silver" is by T. A. Rickard, editor of the *Engineering and Mining Journal*, and is naturally one of the most exhaustive in the volume. Of leading interest is the chapter on "Iron and Steel," containing nearly 100 pages. The editor of this chapter, Frederick Hobart, draws from a great variety of sources, and as we have noted in previous reviews, there is less care in this chapter than is to be expected from so pretentious a publication, about crediting statistics to those who have compiled them. The Lake Superior iron ore statistics, for example, are taken from *The Iron Trade Review* without credit. Three features of special interest to mining engineers and mining capitalists are the reviews of the literature on ore dressing, on ore deposits and on mining progress in 1903. It is characteristic of the book in all its reviews that it pays attention to the commercial side as well as to the technical side of mineral developments in the year covered. To bring together such a mass of information, requiring communication with authorities in all parts of the United States—and indeed of the world—is a monumental task, and the result is highly creditable to the editors and compilers.

Important Moves in the Connellsville Region.

Negotiations are reported under way for the purchase of the coke property of the Hecla Coke Co., Pittsburg, located in the Connellsville region, by the H. C. Frick Coke Co., the coke operating subsidiary of the United States Steel Corporation The property has already been carefully inspected by officials of the H. C. Frick Coke Co., and it is reported that the transfer is probable. The Hecla Coke Co. has one of the most important operations in the entire region and it would prove a valuable asset to the United States Steel Corporation. The property includes 1,100 ovens in the heart of the Connellsville region, together with about 5,000 acres of coal land. The property is valued at about $7,000,000. The H. C. Frick Coke Co. has been quietly extending its Connellsville holdings and there is little doubt that efforts will be made to secure the most important outside operations. This year practically all of the coke produced at the 1,100 ovens of the Oliver & Snyder Steel Co., Pittsburg, is being shipped to the furnaces of the United States Steel Corporation, and the H. C. Frick Coke Co. controls one-half interest in the Hostetter Connellsville Coke Co., operating 700 ovens. Only recently the Crossland plant of the Atlas Coke Co. in the Connellsville region, containing 100 ovens, was acquired, together with several other small operations. W. J. Rainey is the largest independent producer in the region operating about 3,000 ovens. The Republic Iron & Steel Co. has awarded a contract for the erection of 400 ovens in the Connellsville field and another independent interest contemplates the erection of 500 ovens.

The Compania Fundidora de Ferro y Acero de Monterey (Monterey Iron & Steel Co.), has recently started work on a plant of 60 coke ovens, which are expected to be in operation by the middle of the year. An additional block of 60 ovens is projected. The mills of the company at Monterey, Mex., are turning out a variety of iron and steel products and a good demand is found in the home market. The enterprise has good prospects and with its own supplies of ore and coal, the company is counted on as an important and permanent factor in the Mexican trade. Its plant is thoroughly equipped and the rod, sheet and rail mills are in position to make a good output at relatively low costs. Vincente Ferrara is president of the company and W. E. Shild general superintendent.

M'Kie & Baxter, engineers and shipbuilders, Govan, Scotland, will build an addition which will double the size of the erecting and machine shops. They will also erect other buildings.

UNITED STATES STEEL CORPORATION EARNINGS.

A regular quarterly dividend of 1¾ percent on the company's preferred stock was declared Jan. 31 by the directors of the United States Steel Corporation. No dividend was declared on the common stock.

A report was issued showing that net earnings for the quarter ended Dec. 31 were $21,458,734, an increase of $6,421,553, as compared with the same quarter a year ago. Unfilled orders on hand Dec. 31 last were 4,696,203 tons, an increase of 1,481,080 tons, as compared with unfilled orders Dec. 31, 1903.

The net earnings and unfilled orders of the corporation by quarters compare as follows:

Quarters ending—	Earnings.	Tons.
Dec. 31, 1904	$21,458,734	4,700,000
Sept. 30, 1904	18,773,000	3,027,436
June 30, 1904	19,490,000	3,192,277
Mar. 31, 1904	13,208,886	4,136,961
Dec. 31, 1903	14,845,041	3,215,123
Sept. 30, 1903	32,203,821	3,728,742
June 30, 1903	36,642,808	4,666,578
Mar. 31, 1903	25,068,707	4,410,719
Dec. 31, 1902	31,985,759	5,347,253
Dec. 31, 1901	29,759,913	4,497,749

Net earnings for 1904, subject to slight changes, aggregate $72,932,277, a decrease of $36,238,875 as compare dwith 1903. The statement shows that $4,385,127 was applied during the last quarter to sinking funds on bonds and depreciation and reserve funds. The year's surplus amounts to $6,225,644. There is charged off for employes' bonus funds and for adjustment of inventory valuations and sundry accounts, $1,135,029.

FOREIGN NOTES.

James Swinburne, past president of the Institution of Electrical Engineers (England) delivered an address to students recently. He said in part: "Whatever might be the case in other professions, in engineering it is quite impossible for anyone to start out with a definite career before him. Probably each man should have a general knowledge of applied physics and chemistry and mathematics, and a special knowledge of one or two subjects. The special knowledge may never come in useful; but the chances are that in the blind stumblings we call our careers, a specialty may be very valuable. One of the great difficulties is to keep knowledge in a polished state ready for immediate use. In practice it may have to lie idle for long periods, and then be wanted very much on short notice. This fact is overlooked by people who suffer from the modern craze for writing about technical education. The only thing to do is to treat knowledge as a huge district into which one's life is long enough to make some very little roads. Unfortunately, education tends to become more and more unpractical as time goes on. The average science teacher has a wholly wrong view of the relations of science and business. If you examine the large industries you will find the commercial or business man with little or no technical knowledge at the top of the tree. If you confine your attention to engineers, you will find the engineers who make the biggest incomes and occupy the most important and responsible positions are those who have most business or practical knowledge. Our leading consulting engineers do not spend a large portion of their lives plotting curves, counting electrons, or even making anything more than arithmetical calculations. They speed their time dealing with large questions on purely commercial lines; and as a rule the bigger the engineer the more he knows about practice and business, and the less he knows about text-book science."

Robt. Armitage has been elected Lord Mayor of Leeds, and Joseph Jonas, steel manufacturer, Lord Mayor of Sheffield.

Richardsons, Westgarth & Co., Ltd., of Hartlepool, Eng., marine and electrical engineers, manufactured engines of a total of 80,090 h. p. in 1904. Of steamship engines ranging in the main from 3,000 down to 1,000 i. h. p. they manufactured 54,720 h. p. In addition were 25,370 h. p. in 28 sets of land engines, including Parsons turbines, Cockerill gas engines, steam and gas engines and pumps. The works also put out 79 independent boilers of a total of 12,900 h. p.

In their annual report, the directors of the British Westinghouse Electric & Mfg. Co, Ltd, state that the result obtained at the close of the first complete year of manufacturing has shown that the general expense and outlay incidental to the development required in connection with the company's plant at Trafford Park has been much greater than the management anticipated. These expenditures have, however, placed the factory in an advantageous position to execute orders in the future for large generating units. The following particulars are given covering orders received during the past three years: Orders received during the year ended July 31, 1902, £932,000; during the year ended July 31, 1903, £1,657,114; during the year ended July 31, 1904, £927, 336. The company took orders during the first three months of the current business year aggregating £311,000, as compared with a total of £210,000 for the corresponding period of last year.

For some time there has been a movement on the London Metal Exchange to include in the dealings in standard foundry iron certain brands of American pig iron produced in the Southern States. This has resulted in the announcement of a new set of rules for standard foundry pig iron contracts by the committee of the exchange appointed to deal with this matter. These rules provide for dealings in 18 brands of Scotch iron, 19 brands of Middlesborough iron, 14 brands of Alabama and Tennessee iron, and five brands of Lincolnshire. All the leading Scotch and Middlesborough brands are included, and the rules embrace a series of rebates and premiums, relatively to the standard quality known as Middlesbrough No. 3, as well as provisions for the sampling and analysis of each 500-ton parcel, the charges of which are to be paid by the seller.

One of the features of the London Metal Exchange market is that its transactions are to a large extent founded on what is known as G. M. B., or standard brands, of foundry iron. Scotch foundry irons have heretofore set the standard in reality, though Middlesbrough brands outnumbered the Scotch brands. The new order of things brings in Lincolnshire brands as well as those of the Southern States. British and Southern irons as now classified differ chiefly in silicon. The silicon percentages in the two classes run approximately as follows:

Grade	G. M. B.	Southern Iron.
No. 1	2.50 percent to 3.50 percent	2.75 percent
" 2	2.50 " 3.50 "	2.35 "
" 3	1.75 " 3.00 "	1.90 "
" 4	1.50 " 2.50 "	1.75 "

Thomas Carlisle, who for 16 years was manager of the Bessemer department of the Moss Bay Iron & Steel Works, Workington, has been appointed manager of the Penistone Steel Works, belonging to Cammell, Laird & Co. Originally belonging to Dronfield, Mr. Carlisle has had large experience in steel making in the United States and at Cammell & Co.'s Derwent Works. He recently attended the meetings of the Iron and Steel Institute in the United States.

The firm of William Wilson & Co., boilermakers, Glasgow, has acquired several acres at Tollcross, near Glasgow, and is now erecting large boiler works which will be equipped with the most modern machine tools for the construction of high class boilers. The firm has occupied its present plant for more than half a century.

The Hayes Mfg. Co., Detroit, which makes a specialty of manufacturing sheet iron goods, will start a branch plant at Lansing, Mich. The Detroit plant will also be enlarged.

Pig Iron Production in 1904.

The American Iron & Steel Association has received from manufacturers and has published in the Feb. 1 issue of the *Bulletin* complete statistics of the production of all kinds of pig iron in the United States in 1904. The total production of pig iron in 1904 was 16,497,033 gross tons, against 18,009,252 tons in 1903, 17,821,307 tons in 1902, 15,878,354 tons in 1901, 13,789,242 tons in 1900, 13,620,703 tons in 1899, and 11,773,934 tons in 1898. The following table gives the half-yearly production in the last four years in gross tons.

Periods.	1901.	1902.	1903.	1904.
First half.....	7,674,613	8,808,574	9,707,367	8,173,438
Second half	8,203,741	9,012,733	8,301,885	8,323,595
Total	15,878,354	17,821,307	18,009,252	16,497,033

The production of 1904 was 1,512,219 tons less than that of 1903. The production in the second half of 1904 was 150,157 tons more than that of the first half. The whole number of furnaces in blast on Dec. 31, 1904, was 261, against 216 on June 30, 1904, and 182 on Dec. 31, 1903. The number of furnaces in blast at the end of 1904 was 45 larger than on June 30 of the same year and 79 larger than on Dec. 31, 1903. The production by states in the year was as follows:

TOTAL PRODUCTION OF PIG IRON.

States	Blast Furnaces: In blast June 30, 1904	Blast Furnaces: Dec. 31, 1904: In	Out	Total	Production Gross tons of 2,240 lb. (Includes Spiegeleisen): First half of 1904	Second half of 1904	Total for 1904
Massachusetts	1	1	1	2	1,242	1,907	3,149
Connecticut	1	2	1	3	4,325	4,597	8,922
New York	10	12	10	22	250,980	354,729	605,709
New Jersey	5	5	7	12	121,294	141,000	262,294
Pennsylvania	83	108	50	158	3,713,867	3,930,454	7,644,321
Maryland	3	4	2	6	135,416	158,025	293,441
Virginia	12	12	14	26	186,037	124,489	310,526
N. Carolina			1	1	40,508	29,648	70,156
Georgia	3	2	2	4			
Alabama	25	25	24	49	800,256	653,257	1,453,513
Texas	1	1	3	4	3,834	1,696	5,530
West Virginia	4	4		4	103,153	167,792	270,945
Kentucky	2	3	4	7	17,516	19,590	37,106
Tennessee	11	10	12	22	165,883	136,213	302,096
Ohio	31	43	17	60	1,540,743	1,437,186	2,977,929
Illinois	13	12	9	21	798,221	857,770	1,655,991
Michigan	4	6	6	12	138,744	94,481	233,225
Wisconsin	3	6		6	104,437	105,867	210,404
Minnesota		1		1			
Missouri	2	2		2			
Colorado	2	2	3	5	46,982	104,794	151,776
Oregon			1	1			
Washington			1	1			
Total, 1904.	216	261	168	429	8,173,438	8,323,595	16,497,033
Total, 1903.	320	182	243	425	9,707,367	8,301,885	18,009,252

The production of charcoal pig iron in 1904 was 337,529 tons, against 504,757 tons in 1903 and 378,504 tons in 1902. The production in 1904 was 167,228 tons less than in 1903 and 40,975 tons less than in 1902. The production according to fuel is given in the following table which shows also the unsold stocks in makers' hands, distributed according to fuel, at the end of the four half year periods terminating June 30, 1903, Dec. 31, 1903, June 30, 1904, and Dec. 31, 1904:

UNSOLD STOCKS AND PRODUCTION ACCORDING TO FUEL.

Fuel	Stocks Unsold Gross tons of 2,240 lb.: June 30, 1903	Dec. 31, 1903	June 30, 1904	Dec. 31, 1904	Production Gross tons of 2,240 lb. (Includes Spiegeleisen): First half of 1904	Second half of 1904	Total for 1904
Bituminous	97,694	407,881	381,201	240,703	7,337,279	7,594,085	14,931,364
Anth. and anth. & coke	15,673	62,901	49,740	27,586	622,803	605,337	1,228,140
Charcoal	12,934	120,656	192,313	140,503	213,356	124,173	337,529
Total	126,301	591,438	623,254	408,792	8,173,438	8,323,595	16,497,033

There were 170 bituminous ore coke furnaces in blast on June 30, 1904, against 206 at the close of the year; 28 anthracite on June 30 against 38 on Dec. 31, and 18 charcoal on June 30, against 17.

The stocks of pig iron which were unsold in the hands of manufacturers or which were under their control in warrant yards and elsewhere at the close of 1904, and were not intended for their own consumption, amounted to 408,792 tons, against 623,254 tons on June 30, 1904, and 591,438 tons on Dec. 31, 1903. The American Pig Iron Storage Warrant Co. held 55,350 tons of pig iron in its yards on Dec. 31, 1904, of which 17,700 tons, included above, were reported as being still controlled by the makers, leaving 37,650 tons in other hands. Adding this 37,650 tons to the 408,792 tons noted above gives a total of 446,442 tons on the market at the close of 1904. The distribution of unsold stocks at the end of the last four half-year periods is shown in the following table:

TOTAL STOCKS OF UNSOLD PIG IRON.

States	Gross tons of 2,240 lb.: June 30, 1903	Dec. 31, 1903	June 30, 1904	Dec. 31, 1904
Massachusetts and Conn.	477	3,452	3,142	1,451
New York	4,895	12,932	26,517	23,957
New Jersey	2,100	9,892	14,959	9,048
Pennsylvania	24,413	106,472	114,477	55,538
Maryland and Virginia	16,756	25,823	69,880	31,032
North Carolina, Ga., and Tex.	2,416	10,226	31,576	14,495
Alabama	30,619	234,828	110,814	112,673
Kentucky and West Va.	5,316	16,422	2,315	15,936
Tennessee	11,408	22,019	15,781	5,266
Ohio	20,073	72,189	99,942	36,500
Michigan and Minnesota, Illinois and Wisconsin, Missouri and Colorado, Pacific States	7,828	77,183	133,851	100,896
Total	126,301	591,438	623,254	408,792

STOCKS OF PIG IRON IN PENNSYLVANIA AND OHIO.

Pennsylvania	Lehigh Valley	6,741	33,324	29,434	10,826
	Schuylkill Valley	1,034	14,079	5,580	2,800
	Upper Susquehanna V	3,941	1,021	1,989	1,258
	Lower Susquehanna V				
	Juniata Valley	5,263	19,617	12,170	7,786
	Allegheny County	500	1,200		
	Shenango Valley	3,610	9,222	23,202	28,299
	Miscellaneous bituminous	2,754	26,435	41,012	3,484
	Charcoal	570	1,574	1,090	1,085
Ohio	Mahoning Valley bituminous	7,348	47,849	58,624	20,455
	Hocking Valley "			1,200	
	Lake Counties "	905		8,368	
	Miscellaneous "			9,548	5,632
	Hanging Rock "	11,107	19,475	21,442	10,245
	Hanging Rock charcoal	713	4,865	3,760	2,168

The production of Bessemer and low-phosphorus pig iron in 1904 was 9,098,659 tons, against 9,989,908 tons in 1903, a decrease of 891,249 tons. The production of basic pig iron in 1904, not including charcoal of basic quality, was 2,483,104 tons, against 2,040,726 tons in 1903, an increase of 442,378 tons. This is significant in view of the generally reduced pig iron production.

The production of spiegeleisen and ferro-manganese in 1904 was 219,446 tons, against 192,661 tons in 1903. The production of ferro-manganese alone in 1904 amounted to 57,076 tons One company produced 946 tons of ferro-phosphorus in 1904.

PRODUCTION OF BESSEMER AND LOW-PHOSPHORUS PIG IRON.

States	First half of 1904	Second half of 1904	Total for 1904
New York and New Jersey	98,651	151,832	250,483
Pennsylvania	2,265,111	2,246,888	4,511,999
Maryland	135,230	157,412	292,642
West Virginia	102,117	165,388	267,505
Kentucky and Tennessee	11,020	14,189	25,209
Ohio	1,151,235	987,207	2,138,442
Illinois	700,872	723,158	1,424,030
Michigan, Wisconsin, and Minn.	39,430	36,601	76,031
Missouri and Colorado	27,280	85,038	112,318
Total	4,530,946	4,567,713	9,098,659

PRODUCTION OF BESSEMER AND LOW PHOSPHORUS PIG IRON IN PENNSYLVANIA AND OHIO.

Pennsylvania	Lehigh Valley	41,836	22,658	64,494
	Schuylkill Valley	18,816	20,157	38,973
	Upper Susquehanna Valley, Lower Susquehanna Valley, Juniata Valley	137,007	118,084	255,091
	Allegheny County	1,525,195	1,450,401	2,975,596
	Shenango Valley	346,637	405,601	752,238
	Miscellaneous bituminous	195,620	229,987	425,607
Ohio	Mahoning Valley	423,962	490,483	914,445
	Hocking Valley			
	Lake Counties	298,692	298,240	596,932
	Hanging Rock bituminous	63,391	38,265	101,656
	Miscellaneous bituminous	365,190	160,219	525,409

PRODUCTION OF BASIC PIG IRON, NOT INCLUDING CHARCOAL IRON.

New York and New Jersey	51,949	61,739	113,688
Pennsylvania—Allegheny County	542,398	702,744	1,245,142
Other counties	261,200	299,405	560,605
Virginia, Tennessee and Alabama	130,129	189,200	319,329
Ohio, Missouri and Colorado	76,225	168,115	244,340
Total	1,061,901	1,421 203	2,483,104

The following table gives the production by states for the past four years. It is especially interesting as showing the growth of Southern pig iron production between 1901 and 1903, and the relatively small reduction of output in Alabama last year in spite of the coal strike. But for that trouble, it is quite probable that the Alabama output of 1903 and certainly that of 1902 would have been exceeded last year:

PRODUCTION OF ALL KINDS OF PIG IRON FROM 1901 TO 1904 BY STATES.

States	Gross tons of 2,240 lb.			
	1901	1902	1903	1904
Massachusetts	3,386	3,360	3,265	3,149
Connecticut	8,442	12,086	14,501	8,922
New York	283,662	401,309	552,917	605,709
New Jersey	155,746	191,380	211,667	262,294
Pennsylvania	7,343,257	8,117,800	8,211,500	7,644,321
Maryland	303,186	303,229	324,570	293,441
Virginia	448,662	537,216	544,034	310,526
North Carolina, Georgia	27,333	32,315	75,602	70,156
Alabama	1,225,212	1,472,211	1,561,398	1,453,513
Texas	2,273	3,095	11,653	5,530
West Virginia	166,597	183,005	199,013	270,945
Kentucky	68,462	110,725	102,441	37,106
Tennessee	337,139	392,778	418,368	302,096
Ohio	3,326,425	3,631,388	3,287 434	2,977,929
Illinois	1,596,850	1,730,220	1,692,375	1,655,991
Michigan	170,762	155,213	244,709	233,225
Wisconsin, Minnesota, Missouri, Colorado, Washington	207,551	273,987	283,516	210,404
	203,409	269,930	270,289	151,776
Total	15,878,354	17,821,307	18,009,252	16,497,033

A New Grooved Steel Hoop.

A grooved steel hoop to replace the wood hoop on nail kegs, flour and cement barrels is now being manufactured by the Carnegie Steel Co., Pittsburg, and is meeting with success. Owing to the weak nature of these barrels the ordinary hoop was not found satisfactory and although experiments have been under way for many years to replace the wood hoop nothing as desirable as the grooved hoop was found. It was impossible to drive the hoops into place as they are on the heavier oak flasks, tubs and casks of a more substantial nature, nor did the hoop withstand the pressure occasioned by piling one barrel on the other. The groove in the hoop greatly strengthens it and in addition it is kept in place with an ordinary wire bail. The hoops are all riveted. Should the grooved hoop come into general use it will mean the consumption of an additional tonnage of steel.

New uses for steel are being found daily and with the tremendous growth of the country steel consumption promises to increase at a greater rate than ever. Experiments with steel piling, which are now being carried on by both the Carnegie and Jones & Laughlin Steel companies, promise a successful termination. Add to this the steel tie and three new forms of steel replacing wood will have been invented that will consume thousands of tons annually. The steel bed trade, although still in its infancy, requires close to 20,000 tons of angles every year, while close to 25,000 tons of pipe is required each year in the construction of metallic beds.

Rand Drill Co. has just issued two compressor catalogues, Nos. 10 and 11. The number 10 catalogue describes the Imperial type 10 steam, belt, gear and silent chain driven air compressors, giving speeds, capacities, air pressures, horsepowers, etc., and it is illustrated throughout with half tone cuts of the various styles of type 10 machines. Catalogue No. 11 illustrates and describes the Imperial type 11 machines which are vertical compressors built for driving by belt, gear and silent chain.

TONNAGE RECORDS OF ORE SHOVELERS.

H. E. Scott contributes an article to the Journal of the Worcester Polytechnic Institute on ore handling at Conneaut and has the following interesting comment on the work of filling the buckets in the hatches, in that portion of the Conneaut plant in connection with which hand labor is still employed to a considerable extent. The extract is made particularly for the data it gives of the remarkable amounts of ore a practiced shoveler handles in a day:

"Eight men in the hatch with picks and shovels fill the buckets. One man, generally standing on deck, gives signals to the operator, who is in his place in the pier, and also signals to the men in the hatch, so that they may get out of the way when a bucket is lowered. When a bucket is filled, one or two of the shovelers hook on the hoisting tackle, the signal man gives the signal, and the bucket of ore is hoisted vertically out of the hatch, then conveyed along the bridge to the dumping point on the stockpile or in the car. The operator is directed entirely by the signal, as from his position in the pier he is unable to see into the hold of the boat.

"In about a minute the empty bucket returns, the signal man warning the shovelers in the hold as the bucket is lowered. The shovelers place the bucket in the desired position by quickly swinging it as it nears the bottom of the boat, or by rolling it on the bottom of the boat on the rollers. The hoisting tackle is then released from the bail and hooked to a full bucket.

"Timing these operations last July, it was found that with the older rope system it took twelve minutes to make nine trips from the hold of the boat to the stockpile under the back cantilever. Assuming the weight of the ore to be one ton per trip, each man would then have one ton to account for every twelve minutes, or five tons per hour. This year the shovelers are paid thirteen cents per ton. On this basis the wages would amount to sixty-five cents per hour for each man; or from $6.50 to $7.80 per day. The shovelers get 18 cents per ton as a maximum when cleaning up a boat after 80 percent of the cargo has been removed by automatic machines.

"A shoveler takes about forty pounds to a shovelful, (found by counting the shovelfuls and weighing the ore), and he works hard for his money. No doubt some of these men handle from sixty to eighty tons for a day's work. The writer has talked with shovelers who earned as high as $12 per day when the price paid was 18 cents per ton, and he found one man this year, at 13 cents per ton, earned $56 in two weeks. By using good judgment in placing the bucket in the hold, the shovelers can use their picks to cave and tumble a good deal of ore into the bucket without much shoveling; but even forty to eighty tons seems a tremendous day's work for any one man."

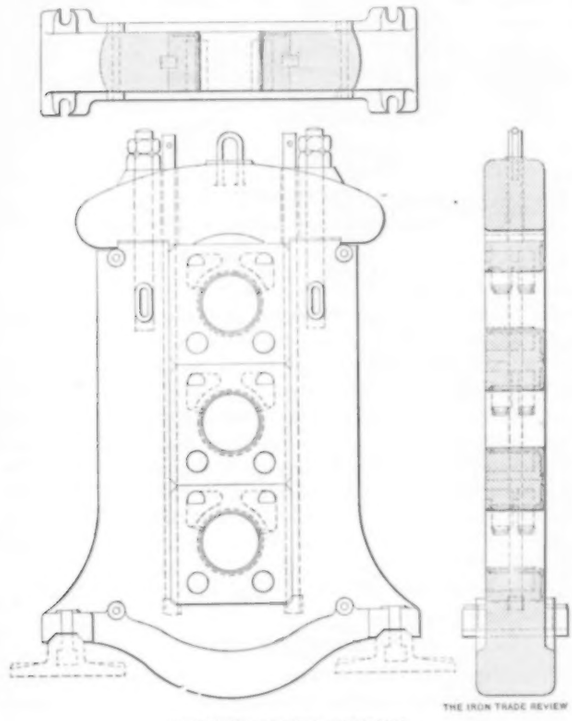
At the last meeting of the American Society of Mechanical Engineers mention was made of a locomotive fireman who, under exceptionally favorable conditions, worked at the rate of 6,000 lb. per hour. The shoveling record, from Mr. Scott's figures, belongs to the workers in ore.

The large horizontal boring and milling machine which was exhibited at St. Louis by the Niles Tool Works of Hamilton, O., has been purchased by the Great Lakes Engineering Works of Detroit, Mich. This tool is one of the largest in the United States of its kind and is to be used by the Great Lakes Engineering Works on their marine engine and ice machinery work, for which they have very large orders.

The Warren Foundry & Machinery Co., Philippsburg, N. J., has secured an order for 11,000 tons cast iron water pipe from the contractor who was awarded the contract by the water department for the Borough of Brooklyn. The price was about $24 at the foundry.

AN IMPROVED PINION HOUSING.

To procure good performance from a train of rolls in iron and steel mills, much depends upon the driving power and the proper distribution thereof through the pinions. The pinion housings and journal boxes should be so constructed as to hold the pinions with certainty in their proper places in relation to the engine and rolls, and there should be means for the quick removal of journal boxes and replacing them with newly lined ones, without taking the pinions out of the housings. The pinion housing shown below, was designed by O. N. Rauschenberg, master mechanic for the Birmingham Rolling Mill Co., and the object of the inventor was so to construct and assemble the parts that each of the boxes might be removable independently of each other and of the pinions. Solid bearing boxes are used, accurately centered, and the height of each made to correspond with the pitch diameter of the pinions, so that when once assembled and locked in the housings by the vertically sliding keys, no brasses, liners, plates or bolts are required.



IMPROVED PINION HOUSING.

The illustrations give a horizontal sectional view through the middle bearing, a side view of the housing showing the boxes keyed in place, and a vertical sectional view through the center of the boxes. As shown, the housing is provided with the usual vertical standards integral with the base portion and has a cap bolted to the tops of the two standards. The cap may be done away with by patterning after the ordinary solid top roll housing. This would make a cheaper and stronger housing, but the construction would require windows wide enough to allow the pinions to pass through and would call for a large central screw for holding the boxes firmly down in position. Vertical grooves or recesses are shown in the center of the inner faces of these standards. The bearing boxes are rectangular castings suitably cored to provide bearings for the pinions, and having in the two side faces grooves to match those in the housing standards. These boxes are prepared to fit accurately between the standards and are so centered and proportioned with regard to each other and the desired pitch of the pinions that new ones can be inserted without disturbing the adjustment of the pinions or the other boxes. These boxes are used in sets corresponding to the different pitch circles of the pinions. Where, for example, the pinions have an eight-inch pitch diameter their bearing boxes are all eight inches in height and have the same outer contour. Therefore when new ones are inserted the positions of the pitch circles of the several pinions remain unaltered.

When the parts are assembled in the housings, the corresponding grooves of the standards and boxes are in alignment and opposite each other, forming a continuous guide for the locking keys which pass through suitable openings in the housing cap and slide vertically in the guides. These sliding keys lock the boxes securely in position in the housing. Heretofore when it became necessary to remove or replace one of the boxes, say the lower one, it was necessary to remove the cap, take out the boxes and pinions above the one to be repaired, and finally lift that pinion out, so that the old box could be removed and the new one fitted on, after which the several parts were replaced in position in the housing. This operation requires much time and necessitates the readjustment of the parts when the boxes are not accurately centered or spaced, and liners are necessary. It is obvious from the new construction that when the boxes have been centered and adjusted with relation to each other and locked in the housing by the sliding keys, they are held firmly in position until it becomes necessary to remove any one of them, which can be done by raising the keys until the box to be removed is unlocked, after which it can be slipped out of the housing and a new one shoved in its place, when the keys are again lowered locking all the boxes as before.

These pinion housings have been in use for over two years at the Birmingham, Ala., Rolling Mill and at the Eclipse Rolling Mill, and the record kept shows that no time has been lost by reason of trouble with the pinion housings or journal boxes, or by reason of the pinions being out of adjustment. Arrangements have been made for installing similar pinion housings in the Bessemer, Ala., Rolling Mill and also in the Alliance Bolt Co. mills at Fort Worth, Tex.

It is reported in New York that Samuel Spencer, president of the Southern Railway, and the personal representative of J. P. Morgan in a large number of corporations, will shortly be elected a director of the Tennessee Coal, Iron & Railroad Co., and that he will also become a member of the executive committee and take a prominent part in the management of the company. While it is not believed that Southern Railway interests have purchased actual control, they are understood to have acquired a sufficiently large amount of stock to give them an important voice in the management.

The Badger State Machine Co., Janesville, Wis., has found it necessary to erect a foundry to make its own castings instead of buying the casting as has been done since the company was organized. The company also desires to make other improvements and is considering moving to some other city. Rochelle, Ill., has offered the company a site and a cash bonus of $7,000, but the Janesville Business Men's Association is endeavoring to raise a fund which will insure the keeping of the company in that city.

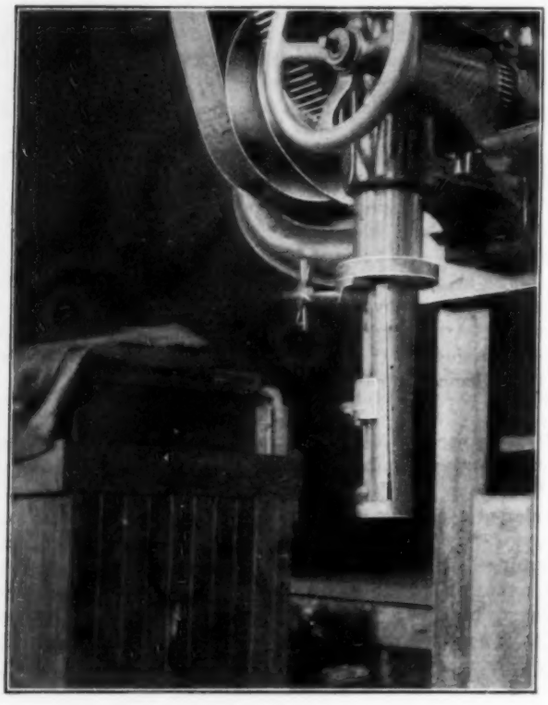
The McClintic-Marshall Construction Co., Pittsburg, recently completed one of the largest steel girders ever built, at its Rankin, Pa., plant. It will be used in the construction of the new Majestic Theater building, Chicago, which will be 14 stories high. The girder is 180 ft. long, 11 ft. high and weighs 40 tons. Three special freight cars were required to haul it to Chicago.

Copies of *The Iron Trade Review* of March 24, 1904, are wanted at the office of the paper.

Some New Things for the Shop, Chiefly by Way of the Patent Office.

A Taper Boring Tool.

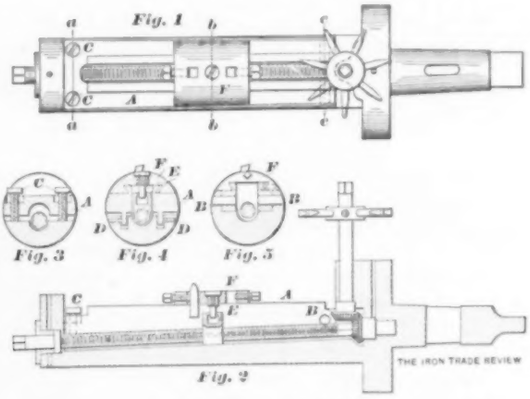
An adjustable boring tool for taper work has been patented by William N. John, Milwaukee, and is now owned by D. C. John, of Oshkosh, Wis. This boring bar has been in use in the shops of the Chicago, Milwaukee & St. Paul Railroad for more than a year, though it has but recently been patented. The railroad company has had it in service for boring all the piston fits in both simple and compound crossheads. The carriage or toolholder moves up or down the taper slide as the bar rotates, the feed screw and nut being moved by a star wheel which comes in contact with a tripping dog fastened to the stationary part of the machine. The star wheel can be attached at end or side of the boring bar as is most convenient. The carriage moves in a dovetailed slide and has a gib and adjusting screws to take up for wear. The



TAPER BORING TOOL IN DRILL PRESS.

bar is graduated at one end so that it may be readily set for any required taper. The cutter is made from square stock, ground and hardened, and is then ready for use, no forging being necessary. The tool can be employed in lathe, drill press or mill and is here illustrated as applied to a drill press.

The detail drawings show a plan in Fig. 1 and Fig. 2 represents a longitudinal section through the boring bar. Fig. 3 is a transverse section on the line a-a of Fig. 1; Fig. 4 is another section on the line b-b, and Fig. 5 is a similar section on c-c of Fig. 1. The boring bar has a shank to fit the taper hole in machine tool spindle. The ways, C, support a carriage D holding the cutter and this is traversed from end to end of the boring bar by a feed shaft as the tool rotates in the machine. A star wheel is connected to the feed shaft through bevel gears and it will be understood that the feed shaft is held in permanently located bearings, the taper adjustment of the cutter not interfering with the position of the driving shaft. As the boring tool rotates, the star wheel strikes a stationary dog and is in this manner employed to drive the feed shaft and traverse the cutter. The ways A are made separate from the boring tool body and pivoted to it by the trunnions B and the opposite ends are adjustable to the screws C. The adjusting screws have a threaded bearing in the ways C, while the points come in contact with the body of the bar. The rotation of the adjusting screws will

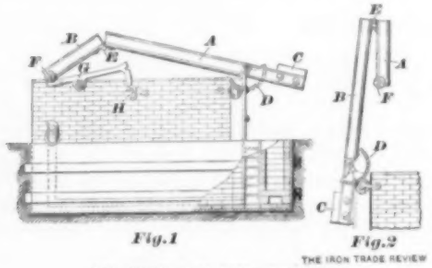


A TOOL FOR TAPER BORING.

thus increase or decrease the taper of the tool. The screws can of course be adjusted to bring the ways parallel with the axis of the spindle holding the boring bar and in that case the tool may be used for cutting a straight hole. The feed shaft, at the projecting end is squared for a wrench and when the tool has moved the length of the cut the carriage may be returned to the starting point by hand. When the ways have been set to the desired taper they can be locked in place by setscrews D bearing against the flanges. The trunnion E is secured firmly to the carriage and at the lower end slides in a sleeve, the sliding connection permitting free adjustment of the carriage ways to suit holes of various tapers.

An Annealing Oven.

Joseph Elsner, of Youngstown, O., has designed a foundry oven for annealing castings or drying molds. He proposes to improve the current construction of large doors and tracks



AN OVEN FOR THE FOUNDRY.

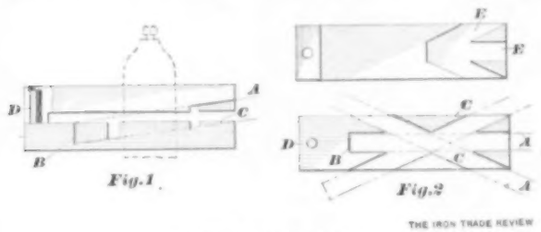
passing into the ovens for the carrying trucks. Foundry space is a valuable asset and the inventor suggests a plan for dispensing with tracks and cars and at the same time have a still greater usefulness of the overhead service.

Fig. 1 is a side view and partial section of an oven constructed in accordance with the invention and having the trap door partly open. Fig. 2 is a detail elevation of the door when fully opened and illustrates the mechanism employed

for opening and closing it. The oven has a sheet metal casing braced with I-beams. The furnace is provided at one end of the structure and access is gained by door and stairway. The top of the oven has metal binding strips around the upper edge forming a casing for the trap door. The door is in two sections, A and B, the section A extending beyond the wall and having a counterbalance C at each side. The trap door proper is made up of metal plates extending between the outer channel irons and fastened to them. The trap door section A is on a rod pivoted in brackets on the oven and passing through the channel irons. This rod has a sector D engaging a pinion, having a shaft and crank for elevating and opening the trap door by hand, assisted by the counterweights. The other section, B, of the trap door is hinged at E to the section A. The door is evidently hinged to secure greater compactness when raised and in order to allow the door to fall in flat condition in closing the oven, short shafts extend through the channel irons and support grooved wheels F. These wheels engage guides G pivoted at opposite sides of the oven. The guides have sectors at the ends with notches for the engagement of the catches H. The catches are held by buttons. The guides G when adjusted in the upper position serve as inclined bearings or tracks for the grooved wheels as they ride upward in opening the oven. When the door is shut the catch H holds the guides G in a position allowing the sections A and B to close snugly. When the trap door is opened in the manner described, the castings or molds are hoisted in and placed upon the floor by the crane, as access to the interior is gained entirely through the upper portion of the oven.

Toolholder Simplicity.

A toolholder for lathe or planer usefulness has been patented by Lewis C. Wilcox, of Trenton, N. J. The designer



A NEW TOOLHOLDER.

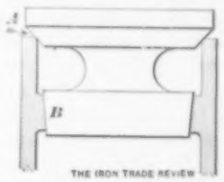
seeks the advantage of a setscrewless holder and the pieces of which it is formed are therefore retained in place with the cutter by the tool post screw only in the case of a lathe or by the nuts of the yoke clamp on a planer, shaper or slotter, as may be required.

Fig. 1 is a partly sectional side view of the toolholder as applied to a lathe, the tool and tool post appearing in dotted lines. Fig. 2 shows plan views of both upper and lower halves of the holder and depicts the grooves for the retention of the cutter. The holder is made up of two similar pieces between which the tool A is clamped. The pieces are channeled out for the cutting tool and the middle groove has an abutment at B supporting the cutter rigidly in position. The grooves are sloping to give the outer end of the cutter A the proper inclination. Similar diagonal channels C are cut of equal depth with the center groove and crossing it. These are not shown with an abutment as at B but would be similarly useful if the design would only permit of it.

The lower half of the toolholder has at the center of the rear end a dowel pin D engaging with the upper half, the latter having a projection to maintain the two parts slightly separated where the cutter enters. The doweled joint fits but loosely in order to permit quick and convenient separation of the toolholder section for cutters that vary considerably in thickness. The under side of the upper toolholder section has grooves E sloping to the rear and matching the channels in the lower section. The principal advantage of the holder is in the absence of projections to interfere with ready handling, etc.

Improving Valve Seats.

The deterioration of the seats of stop valves, and the increasing leakage of steam they permit, have led to innumerable devices to minimize this inconvenience, such as renewable liners, etc. *Engineering* says much of the damage to the seating is due to the cutting action of the steam at high velocity, at the instants the valve is opening and closing, and to prevent this, Messrs. Holden and Brooke, Ltd., West Gorton, Man-



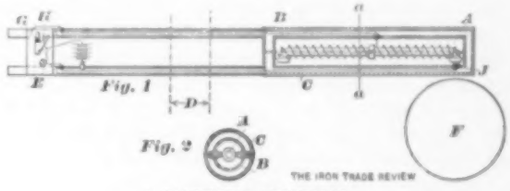
VALVE SEAT PROTECTION.

chester, have brought out a valve in which the seating is protected from this action in a very simple manner. As will be seen from the illustration, the valve is extended downwards to form a kind of piston very slightly conical, which fits into a second seating B. Owing to the very slight taper of this part, the valve proper is well open before any appreciable amount of steam passes it, and similarly, in closing, the steam is practically shut off by the lower part of the valve before the faces meet at A. Valves of this design are said to shut and open more easily than those of the ordinary plain disc type, and have proved very successful under severe conditions of working.

The Magnetic Condition of Heated Metal.

The proper heating of masses of steel prior to hardening or annealing them is recognized as a matter of great importance. Excessive, insufficient or uneven heating are all highly objectionable and various means have been devised for the purpose of indicating the temperature of the metal while it is heating for subsequent treatment. George W. Sargent, of Reading, Pa., has patented and assigned to the Carpenter Steel Co., of that city, an apparatus for indicating the condition of the heated metal, independent of the exterior temperature to which it is exposed and without disturbance of the heating operation.

It is essential to the securing of satisfactory results in hardening or annealing or in working a mass of steel that it should first be so uniformly heated as to obtain the same molecular structure, crystallization taking place above the so-called critical point, while below this temperature there is no such molecular change. In providing for a direct indica-



A MAGNETIC INDICATOR.

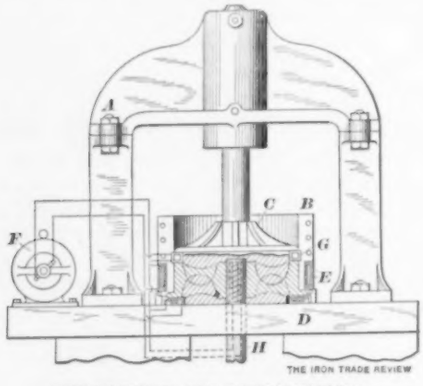
tion of the heating metal, the inventor makes use of the fact that steel is magnetic at temperatures below this stage, the critical point, and non-magnetic at higher temperatures. Fig. 1 is a sectional elevation of the apparatus and Fig. 2 is a cross section along the line a-a of Fig. 1. A is the soft iron core of an electro-magnetic needle centrally mounted in bearings in a tube B, the latter enclosed in a water jacket C extending through the walls of the furnace, shown by dotted lines at D. This conduit extension carries at the outer end

a switch, an indicator E and a battery. The tube B and the jacket C can be made of copper tubing. The heated metal is at F and above this is located one pole of the magnetic needle. The tube B is centrally supported in the jacket C by wings, as shown in Fig. 2, these serving also as partitions for the circulation of the cooling water around the magnet and connections.

One end of the wrapping wire of the magnet is connected to a pole of the battery through the conducting jacket C and the other end goes to the switch board G, from which it connects through the switch with the other pole of the battery when the needle is magnetized. The indicator E may be an alarm, light or other signal arranged in a shunt circuit with one connection to a clip H engaged by an arm of the switch, and another connection with an insulated post J in the tube B. When the switch is turned to engage the terminals, as at H, the needle will be magnetized and the indicator will be operated or not, depending upon the magnetic condition of the heating metal at F. So long as this metal remains substantially magnetic the pole of the needle will deflect toward it and the indicator will be operated. When the metal has been sufficiently heated, however, and approximately demagnetized, the needle will not be deflected so as to establish the shunt circuit, and that fact will be manifest by failure of the indicator to respond to the magnetic influence.

A Steel Casting Process.

A process for making steel castings has been devised by John H. Forbes, of Cincinnati, and the engraving depicts a



THE FOUNDRY USE OF MAGNETISM.

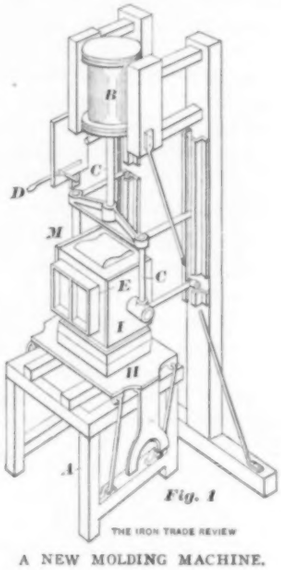
side elevation of a machine adapted to carry out the invention.

A suitable press, A, hydraulic or otherwise, has between the uprights a mold at B for the reception of the molten metal. The top of the mold may be either formed integral with or separate from the presser C, secured to the lower end of the piston rod. A car wheel casting is shown in the mold and the peculiar feature of the invention is in the means employed for making an iron casting with a steel face on any part—as on the tread of the wheel. Surrounding the tread of the car wheel is an electro-magnetic ring E, the current being supplied from a generator at F. Another ring D is in the bottom of the mold and a third ring G is at the top of the mold—both rings deriving their electricity from the generator at F. When the electro-magnets D, E and G are energized the inventor proposes to line the magnetized walls of the mold with the particular quality of metal desired on the face of the completed casting. This metal may, of course, be steel borings, turnings, filings, etc., and a steel wire net can be utilized for retaining the smaller particles of metal in place. The body of the casting is then poured of ordinary gray iron and pressure is applied by the press A to form the whole casting into a closely grained mass. The object of magnetizing a part of the mold during the process of casting is of course to retain the particles of metal of extra quality in position near the surface and have the heat in the body of the casting fuse these in place. Nothing is said in the patent about the different magnetic conditions of these steel particles at various temperatures and it is apparently taken for granted that at a fusing heat they will stay in place at the surface of the casting.

In casting loose pulleys, sheaves, or similar work having an internal bearing, the magnet rings may be omitted and a core magnetized, as shown by the dotted lines at H. This core can be surrounded by particles of metal, as in the case of the car wheel rim, the magnetism being relied upon to hold the metal against washing away when pouring. Just how far this will be the case at the higher temperatures and with usual foundry practice, will be speedily disclosed when the scheme is put into operation.

Molding Machine Improvement.

A molding machine in which particular attention has been paid to means for packing the sand about the pattern without hand ramming is the subject of a recent patent by Edward Pipher, of Detroit, Mich. The mechanism is designed for the following operations: Filling the proper quantity of loose sand into the flask around the pattern; ramming the sand hard between the pattern and around the margin of the flask;

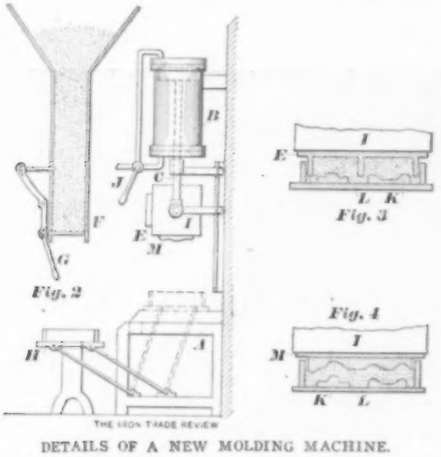


A NEW MOLDING MACHINE.

packing the sand above the patterns to a uniform degree of hardness and finally striking off the sand at the top of the flask. The apparatus has a sand hopper and spout for discharging a measured quantity of sand, a bench for the flask, a power press above the bench and a forming or pressing head carried by the plunger. A movable table carries the flask to the bench from the point where it receives the loose sand.

Fig. 1 is a perspective view of the machine. Fig. 2 is a side elevation and Figs. 3 and 4 are sections through a part of Fig. 2, showing the operation of the machine. The bench A is an open framework having cross bars supporting the work. Directly above this bench is the plunger mechanism, comprising the cylinder B and the piston and frame at C. The cylinder is mounted to leave a space in front at the sides of the bench unobstructed. This may be accomplished by securing the cylinder to the wall of the building, as in Fig. 2, or by a projecting frame, as in Fig. 1. A sand hopper is placed in front of the cylinder and has a discharge spout F. The spout has gate valves operated by the lever G for measuring the sand supplied to the flask. The valves should, of course, be independently adjustable for setting to any required quantity and should also have independent action so that both will not be partly open at the same time. The means for securing these conditions are readily capable of design but do not appear in the engravings here shown. The swinging table H

is attached to the bench A by links, the position at each limit of the link movement being seen in Fig. 2. In the full line position the table H is under the spout F and when swung up into the position shown by the dotted lines the table will rest on the cross bars directly under the plunger. The piston rod has a rotary head I pivoted in the fork, the latter being guided by arms projecting to the rear and provided with anti-friction rolls in the vertical ways. The rotary head is held by a locking pin which is withdrawn on the upward stroke of the piston, a finger on the pin striking a releasing cam. A hand lever D has a sliding bolt to engage with lugs on the end of the head I and as the latter travels upward free of the locking bolt it is rotated through a quarter of a revolution. The valve to the cylinder has a handle J in convenient position. Two faces of the rotating head are shaped with a view to peen and press the sand, the two being shown respectively in Figs. 3 and 4; peen being understood as the more compacting operation on the sand. The face E has a marginal flange for ramming the sand at the margin of the flask and the face M has a form which in general lines is a counterpart of the pattern. The operator taking his position in front of the machine places one section of the flask on the table H. He then places the pattern K inside or, where necessary, the pattern K with follower board L is placed on the table first



DETAILS OF A NEW MOLDING MACHINE.

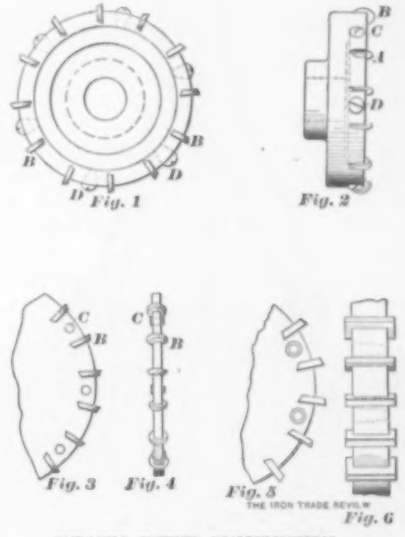
and then the flask above it. The operations follow of filling the flask with loose sand from the hopper, raising the table H from floor to bench, working the valve by J and pressing the peening face E into the flask, packing all the sand, but more particularly compacting the marginal portions. The valve is then reversed, the head rotates as it rises and the next face conforms to the lines of the pattern and the sand in contact with the pattern then gets a uniform pressure. The mold is evidently removed to another table for rapping and removing the pattern. It would appear quite feasible to have a swinging spout to the sand hopper and then the table H need not be swung to and from the floor position and the bench, the spout being brought over the flask as it rests under the plunger.

Automatic Speed Regulation.

Newton Bros., of Derby, Eng., have introduced an arrangement for the automatic speed regulation of machine tools. A variable speed, shunt controlled motor, has shunt resistance, the latter being operated directly from the carriage of a lathe or a convenient part of any machine tool. The operator has only to bring the tool to the position required for the particular article to be machined, and in doing so the speed of the motor is automatically adjusted to give the correct cutting speed for the diameter required. For instance, in turning a cone pulley, if the steps vary only, say, 1 in. in diameter, in moving the tool inward or outward from step to step the cutting speed remains automatically constant throughout.

The Making of Milling Cutters.

A patent by Thomas Eynon, of Chicago, is illustrated in the several views of milling cutter construction. Fig. 1 is an end elevation of a milling cutter and Fig. 2 is a side elevation. Fig. 3 is a fragmentary end elevation of a slightly modified form and Fig. 4 is a side elevation of Fig. 3. Figs. 5 and 6 are end and side elevations of further modifications. The inventor contemplates clamping the milling teeth and the means employed for the clamping action can be applied to a disc, as in Figs. 3 and 4, and the disc keyed to a shaft or the cutting discs may be fastened to a milling head, as in Figs. 1 and 2. The outer edge of the head has a series of spaced notches A of a width to snugly fit the milling teeth B. These teeth are shown as solid discs with beveled edges. The notches divide the milling head into a series of segments, each alternate one having an opening C for an expanding plug D. The openings C are spaced from the edge of the milling head so as to leave the rim continuous except for the notches A. When the teeth are placed in the notches A and the plugs D are driven home the material of the head is crowded toward the teeth and



MILLING CUTTER CONSTRUCTION.

clamps them. In Figs. 3 and 4 a disc has openings transversely instead of radially, as in Figs. 1 and 2. The arrangement in Figs. 5 and 6 is of similar type to the others but for holding teeth of rectangular section. The circular cutters can be rotated and clamped anew until the entire cutting circumference has been utilized.

Lake Erie Ore Receipts.

In the table published in *The Iron Trade Review* of Dec. 29 regarding ore receipts at Lake Erie ports and ore on dock Dec. 1 an error was made in the Cleveland and Buffalo receipts. The corrected figures are: Receipts at Cleveland, 3,572,228 gross tons; on dock at Cleveland Dec. 1, 1,237,033 gross tons. Receipts at Buffalo—Tonawanda, 2,433,601 gross tons; on dock Buffalo—Tonawanda, Dec. 1, 318,793 gross tons. Total receipts at Lake Erie ports for the season of 1904, 17,932,814 gross tons; total on dock Dec. 1, 5,763,399 tons.

The Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa., has purchased a 32-in. blooming mill from Wicks Bros., Pittsburg. All the machinery required to operate it, together with shears and pits, will also be furnished by Wickes Bros. It will be driven by a pair of 28x48 engines. Two four-pit soaking furnaces will be built. Wickes Bros. also sold John Pender, Sydney, Australia, a 22-in. mill and a 18x36-in. Corliss engine.

LIFTING MAGNETS.

Wherever steel or iron is handled in quantities by means of cranes a suitable lifting magnet is understood to economize in time and labor sufficient to pay for itself in from one to six months. This statement is supported by experience in steel plants, jobbing houses, safe works, etc., and is not improbable when the methods, chains versus magnet, are compared. In all cases the electro-magnet is used, suspended from the hook of the crane. Direct current at any of the common voltages is employed to energize the magnet. A flexible twin-conductor cable conveys the current to the magnet and a small switch operated by the crane man is usually the only additional apparatus necessary. The amount of current required is small, being from one to twelve amperes, according to the service for which the magnet is designed.

In operation, the magnet is lowered upon the surface of the material and the switch closed. This causes the magnet to attract and hold the load, which may then be hoisted by

FIG. 1.—MAGNET LIFTING COTTERS IN BULK.

the crane and transported to the desired point. By opening the switch the weight is instantly released.

Comparing this method of operation with the common methods of connecting the load to the hook of the crane, with chains, hooks or clamps, the saving in both labor and time is evident. In general the attachment of the magnet to the load, as well as the release, may be accomplished by the crane operator without assistance. This saves the labor of one or more men for prying up the material, attaching hook and chains at the point of suspension and additional men at delivery for unhooking the load from the crane. Magnets can be so quickly attached to and detached from a load that by their use the work which may be done by a given crane is greatly increased, in some cases more than doubled. It frequently occurs that the attachment of lifting magnets to existing cranes greatly increases their capacity for handling material. Lifting magnets require much less head room than the chains for lifting material of considerable width, such as plates, etc. By the use of magnets, therefore, material can be conveniently lifted a greater height in the storage space under a given crane than is otherwise possible with chain slings, and this increases the capacity of storage space without altering the crane runway or enlarging the building.

Lifting magnets may be used to advantage in handling pig iron, scrap, rivets, bolts and similar articles in bulk, as shown in Fig. 1. Ingots, blooms, slabs, billets, bars, plates, rails, structural shapes, pipe, etc., may also be handled to advantage, as in Fig. 2. The Illinois Steel Co. uses fourteen magnets in the South Chicago works alone and has found the economy in time and labor so substantial that they will be put in service wherever possible in all the plants.

A single design of magnets is not adapted to handling the full range of material above mentioned; on the contrary, the magnet must in every case be designed to meet the form of material to be handled. For instance, there is a wide difference in the design of a magnet for ingots or blooms and one adapted to the handling of thin plates. A magnet which would handle five tons in the form of an ingot might not handle 500 pounds of thin plate. It is therefore necessary to understand in each case the operating conditions with special reference to the form and range of material handled.

The question of risk of accident arises and is quite important. The Electric Controller & Supply Co., of Cleveland,

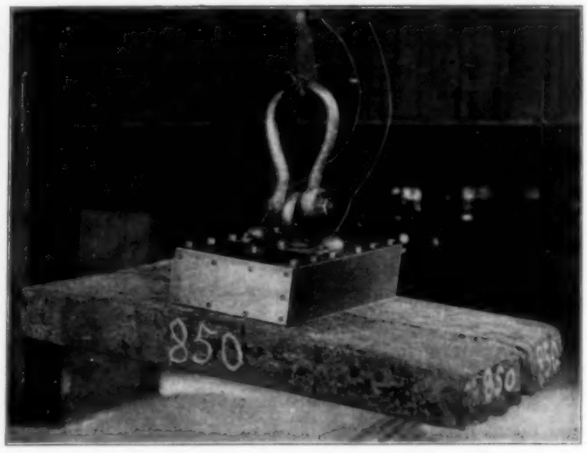


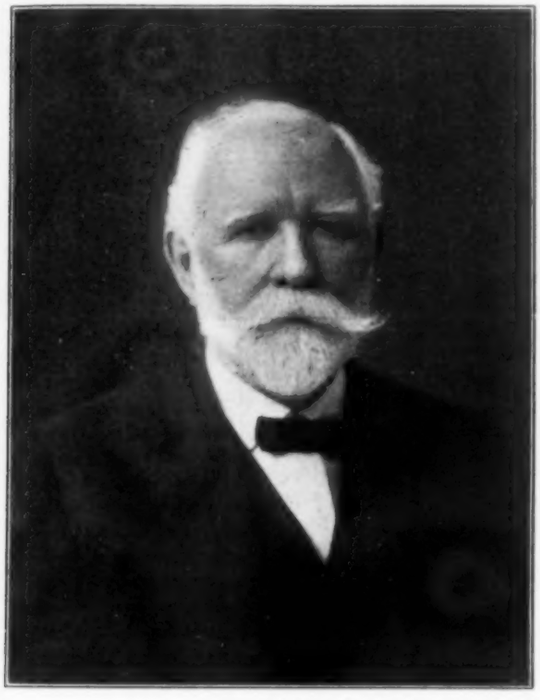
FIG. 2.—MAGNET LIFTING BILLETS.

reports that with experience of scores of lifting magnets in successful operation it has yet to learn of a single accident which has occurred through their use. On the contrary, accidents due to the slipping and breaking of hooks and chains are by no means uncommon. Magnets are built and tested to from four to five times the specified load and in addition to wide experience in the application of lifting magnets the Electric Controller & Supply Co. has comprehensive data, secured through the testing of some forty designs of magnets on a testing machine constructed for this special purpose. Lifting magnets of this make are protected by the Wellman, Clark and Peik patents.

At the annual meeting of the directors of the McKeesport Tin Plate Co., McKeesport, Pa., held last week, officers were elected as follows: Edward R. Crawford, president; E. P. Douglass, vice president; H. M. Clark, secretary; E. W. Pitts, treasurer, and E. J. Lauck, general manager. During 1904 the plant was in steady operation from Jan. 18, and during the year 21,359 tons of black plate were produced and 469,898 boxes of tin plate. The production exceeded that of 1903 by 25,000 boxes.

DEATH OF WILLIAM SELLERS.

William Sellers, founder of the firm of William Sellers & Co., Inc. of Philadelphia, died on Jan. 24 at the University Hospital in Philadelphia. A little more than a year ago Mr. Sellers was attacked by acute kidney trouble, but he recovered and it was not until three weeks ago that the disease reappeared. William Sellers was born on Sept. 19, 1824, in Upper Darby, Delaware County, Pa. He received his early education at a private school built and conducted by his relatives. At the age of 14 years he entered the machine shop of his uncle, J. Morton Poole, on Brandywine creek. There he served as an apprentice until he became of age. He then moved to Providence, R. I., to take charge of the shops of Fairbanks, Bancroft & Co. Two years later he returned to West Philadelphia and began manufacturing on his own account. In less than two years he admitted Mr. Bancroft, one of his former employers, to partnership under the name of Bancroft & Sellers. This firm existed until the death of Mr. Bancroft in 1855. Prior to that time John Sellers, Jr., had been admitted to membership and the firm name became



[Photograph by F. Gutekunst, Philadelphia.]
WILLIAM SELLERS.

William Sellers & Co. In 1873 Mr. Sellers became president of the Midvale Steel Co. at Nicetown. He subsequently reorganized that company. Five years before his election to the presidency of the Midvale he established the Edge Moore Iron Co., for the manufacture of iron and steel structural material. This company made all the iron for the Centennial Exhibition of 1876 and for the Brooklyn bridge between New York and Brooklyn.

Mr. Sellers accepted the position of president of the Franklin Institute in 1864. While president he read a paper on "Screw Threads and Nuts," which has since become the standard for the United States and the form of thread for the continent of Europe. His influence was shown in other investigations for the advancement of the mechanic arts. The valuable work on belting and the strength of gear teeth, etc., conducted by Mr. Wilfred Lewis, now president of the Tabor Mfg. Co. was under the auspices of William Sellers & Co. but has been freely given for the common good. Much of the success of the Centennial Exposition was due to his indefatigable efforts. He was chosen vice president of the Centennial board of finance at its organization. At the Paris Exposition of 1899 the highest award, the Grand Prix, was given to William Sellers & Co., Inc., together with several medals. At the close of the exposition Mr. Sellers received an individual diploma, and was also made a Chevalier of the Legion of Honor.

The influence and personality of Mr. Sellers were seen in other directions. He was for several years a director of the Reading Railway and of the Philadelphia, Wilmington and Baltimore Railroad. In 1868 he was elected a trustee of the University of Pennsylvania. Five years later he was elected a member of the National Academy of Sciences and in the following year was made corresponding member of the Paris Societe d'Encouragement pour l'Industrie Nationale. He was also a member of the Institution of Mechanical Engineers, the Institution of Civil Engineers, the Societe d'Encouragement pour L'Industrie Nationale, of France, the American Society of Civil Engineers and the American Society of Mechanical Engineers.

Whalebacks of Steel Corporation Sold.

The policy of General Manager Coulby, of the Pittsburg Steamship Co., in modernizing the fleet of that company consists of eliminating all vessels not strictly up-to-date and of building new vessels of the most modern construction. In accordance with the policy of selling older vessels, Mr. Coulby has just completed negotiations for the sale of 12 whalebacks to Capt. Benjamin Boutell, of Bay City, Mich., and others. It is understood that Eastern people are interested with Capt. Boutell. The boats will be taken to the Atlantic coast as soon as navigation opens in the spring, and will be operated in the coal trade along the Atlantic. The boats which have just been sold are the steamers E. B. Bartlett, J. L. Colby, A. D. Thomson, G. Colgate Hoyt, and the barges J. S. Russell, J. Whitworth, 105, 107, 109, 110, 116 and 126. About two monts ago Mr. Coulby sold four barges, which will also go to the Atlantic coast. The 16 vessels that will thus be taken out of the lake trade have a carrying capacity of 42,643 tons per trip, and it is estimated that in a season they would move 639,645 tons, allowing 15 trips to the season. The four steamers which are being built for the Pittsburg Steamship Co. will have a capacity of 800,000 tons in a full season, but as they will not be out early in the season, the steel corporation will probably not have more tonnage next season than it had last year. With the four new steamers now building, the corporation will have a fleet of 100 boats.

The blast furnace of the North Works of the Carnegie Steel Co., Sharon, Pa., will be blown in about the middle of February. This stack has been idle for nearly a year. The three blast furnaces at the company's South Works last week produced 1,378 tons of iron during a run of 24 hours. The best previous record was 1,236 tons.

At the meeting of the directors of the Sligo Iron & Steel Co., of Connellsville, Pa., with sales offices at Pittsburg, officers were elected as follows: Charles Davidson, president; J. M. Reid, vice president; Joseph McConnell, secretary, and E. T. Norton, treasurer.

W. W. Shilling, Sharon, Pa., recently made the following installations of Wheeler vertical water tube boilers: Cherry Valley Iron Co., Leetonia, Pa., 800 h. p., and Middlesex, Pa., 400 h. p.; Youngstown Iron Sheet & Tube Co., Sharpsville, Pa., 300 h. p. and the Driggs-Seabury Ordnance Co., Sharon, Pa., 500 h. p.

The Huron Bridge & Iron Co., Port Huron, Mich., recently incorporated with a capital of $50,000, succeeds the Port Huron Bridge Co.

THE ALLIS-CHALMERS CO. GROUP.

At a recent meeting in Milwaukee of the salesmen of the Allis-Chalmers Co. a group photograph was taken of the officers of the company, heads of departments and salesmen. The photograph is here reproduced and with the aid of the key and list of names the halftone is self-explanatory to those not personally acquainted with the several members of this engineering organization. To all others—and they are indeed numerous—the success of the photographer will be obvious. The names follow: 1, James Tribe; 2, G. C. Forgeot; 3, A. Niedermeyer; 4, W. J. Sando, Manager Pumping Engine Dept.; 5, W. H. Whiteside, general manager of sales; 6, W. J. Chalmers, vice president and treasurer; 7, B. H. Warren, president; 8, A. M. Mattice, chief engineer; 9, Arthur Warren, manager of publicity; 10, B. A. Behrend, chief engineer of electrical department; 11, C. C. Tyler, general superintendent; 12, W. M. S. Miller; 13, Ervin Dryer; 14, F. F. Coleman; 15, James Ashworth; 16, H. A. Allen; 17, W. W. Nichols, vice president and secretary; 18, J. F. Harrison, manager flour mill machinery department; 19, Almon Emrie, superintendent Milwaukee Works; 20, W. G. Starkweather; 21, J. R. Jeffrey; 22, C. J. Printz; 23, H. S. Mitchell; 24, I. L. Skeith; 25, G. C. Henry; 26, Robert Mulford; 27, J. C. Buckbee; 28, H. Woodland, assistant treasurer; 29, Clemens Herschel, manager hydraulic turbine department; 30, C. A. Burns; 31, H. L. Wells; 32, Franklin Wharton; 33, H. V. Croll; 34, G. L. Tifft; 35, J. D. Millar; 36, W. C. Trout; 37, M. C. Miller; 38, W. A. Wood; 39, H. Schifflin; 40, J. A. Milne, comptroller; 41, H. S. Pell; 42, G. S. DeWein; 43, H. J. Holden; 44, M. J. Furlong; 45, George T. Thomas; 46, W. E. Dodds, superintendent of construction; 47, Richard Hoppin; 48, H. C. Helvey; 49, Albert Hoppin; 50, A. J. Gates, superintendent Chicago Works No. 1; 51, George L. Fisher; 52, W. N. Tanner; 53, Richard Barnard; 54, F. W. Greenleaf; 55, H. S. Mallalieu; 56, H. L. Keen; 57, J. O. Watkins; 58, R. J. Glendenning; 59, G. F. Collins; 60, R. D. Tomlinson; 61, C. A. Derby; 62, G. A. Berg; 63, J. C. M. Lucas; 64, W. O. Everett; 65, H. A. Hammil; 66, D. T. Jones.

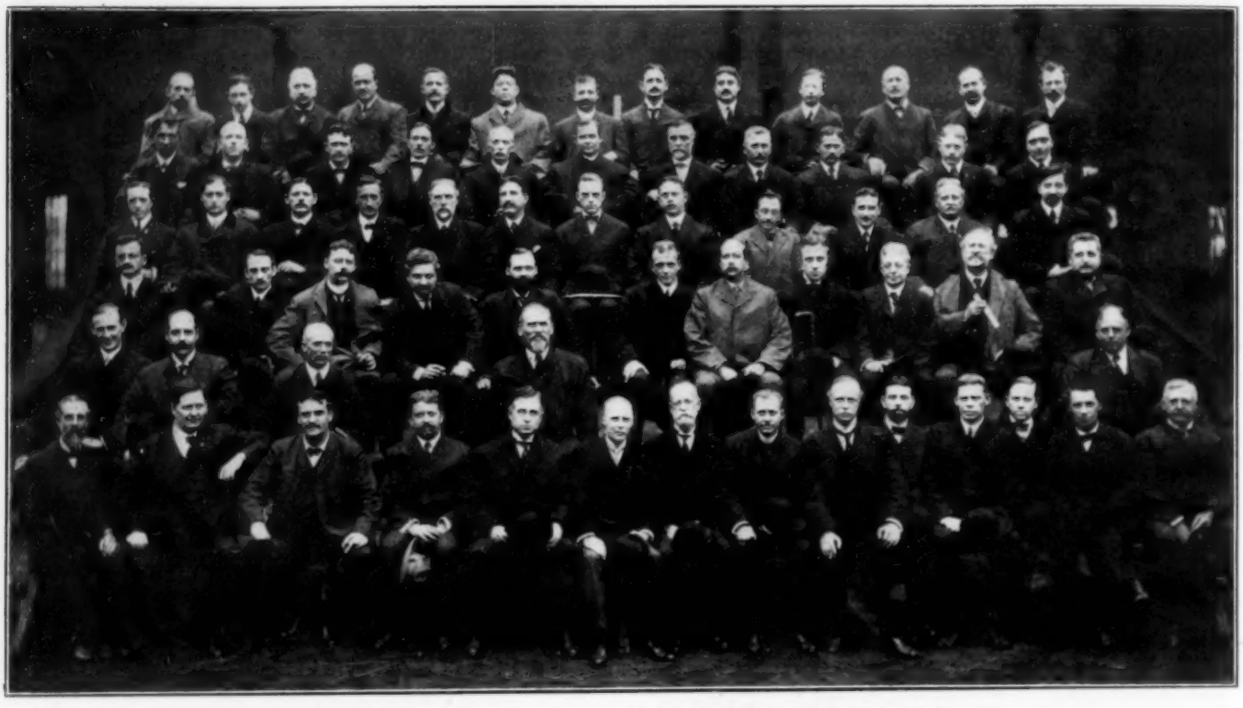


FIG. 1.—OFFICERS, HEADS OF DEPARTMENTS AND SALESMEN OF THE ALLIS-CHALMERS CO.

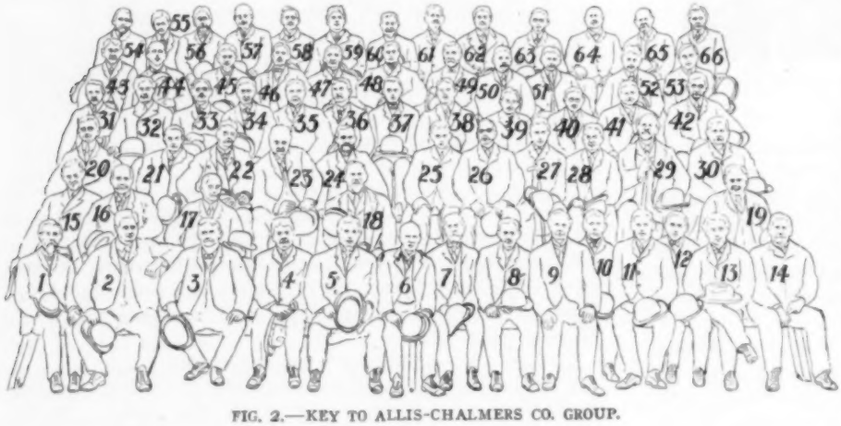


FIG. 2.—KEY TO ALLIS-CHALMERS CO. GROUP.

The Pittsburg & Lake Erie Railroad is making fast time on some of its coke shipments from the Connellsville coke regions to points in the Mahoning and Shenango Valleys. Some of the cars have been returned to the coke region after 20½ hours, whereas four days is considered a good record. These quick shipments will be greatly appreciated by the furnace operators. The coke is being sent out of the region in solid trains.

At a meeting of the stockholders of the Wheeling Steel & Iron Co., Wheeling, W. Va., held last week, directors were elected as follows: C. R. Hubbard, W. S. Stifel, A. J. Clark, Ed Hazlett, G. K. Wheat, W. A. Islett, H. H. Hornbrook, J. J. DeBois and Geo. Wise.

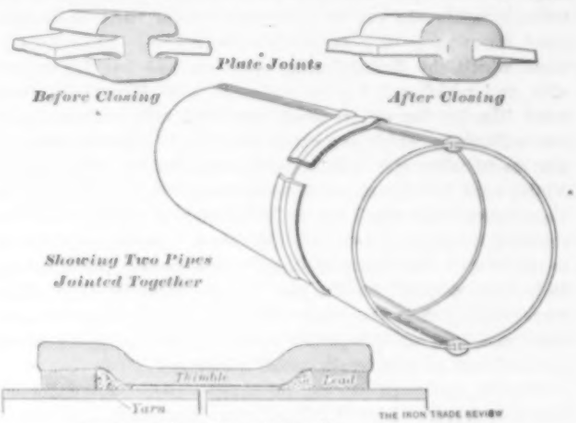
The Lackawanna Steel Co., Buffalo, N. Y., expects to have its merchant mill in operation early in February. The second new blast furnace of this company was blown in Jan. 20.

LOCKING BAR PIPE.

In some literature recently prepared by the International Pump Co., on the pumping system installed in the Coolgardie gold fields in Australia, 363 miles from Fremantle on the west coast, an interesting feature is the description of the Mephan-Ferguson patent locking bar pipe. This is employed on the entire 330 miles of pipe line reaching from a main reservoir in the Darling ranges, 30 miles from the west coast of Australia, to the gold fields. The pipe section consists of two steel plates rolled into semi-circular form, the edges being upset by special machinery. The edges of the plates fit in grooves in steel bars running the length of each pipe section. The ribs are in I-beam section, the web being quite short. The two short webs make up the distance that the widths of the two plates are short of the whole circumference of the pipe as illustrated by the engraving. When the plates are in position for assembling, the flanges of the ribs are pressed by hydraulic machinery over the upset edges of the plates and form tight lock joints without projections to impede the flow of water. The ends of the pipe sections are then trimmed ready for coupling.

The joints at pipe ends are made by a short sleeve or double socket as shown. The space is filled with lead and caulked. The advantages claimed for the pipe so made are that there are no exposed edges of the plates and they will stand much rough usage. The further claim is made that the pipe is 33 percent stronger than double riveted, and 78 percent stronger than single riveted pipe of the same thickness of steel plate. The diameter of the Coolgardie pumping mains is 30 in., each pipe being about 28 ft. in length, made of plates ¼ in. thick, and weighing about 1¼ tons. In some sections, where extra pressure existed, the pipes were made of plates 5-16 in. thick. The total number of pipe sections required was about 60,000 for the main to Coolgardie, and the total estimated weight of steel plate about 76,000 tons. Each pipe was subjected to a hydraulic test of 400 lb. to the square inch, and then immersed in a bath of hot Trinidad asphalt and kept there until the steel rose to the temperature of the bath. The pipe was laid in a trench and then covered to a uniform thickness of 2 ft. with soil, except where it ran through salt country, where the pipe was laid on trestles. No expansion joints were used or found necessary. The lead joints of the circumferential steel sleeves were made by a specially designed caulking machine, this machine being driven electrically for a considerable portion of the time, but latterly the electrical drive had to be abandoned owing to the extreme difficulty in getting water for the engine, and the machine was worked by hand. The lead joint where the locking bar comes in was caulked up by means of a small hydraulic press. An average of from twenty to thirty joints per working day of eight hours was accomplished by the machines. The pipe contracts were signed Oct. 24, 1898, by two Australian firms—Mephan-Ferguson and Hosking Brothers—who erected special works at Midland Junction and Falkirk, West Australia. The total contract price for the pipes delivered at works in West Australia amounted to £1,025,000.

Briefly, the power problem was to pump 5,000,000 gallons per 24 hours against a total estimated head, including friction, of 2,700 ft., through a pipe 30 in. in diameter, and roughly, 330 miles, the speed of the water through the pipe being taken at about 2 ft. per second. From stations 1 to 4, in each station there are three complete sets of pumping machinery and boilers, any one of which is capable of pumping 2,800,000 gallons per 24 hours against a head of 450 ft., so that to get the full quantity of water two sets of engines and pumps are always pumping together into the main, and one set is "spare." From stations 5 to 8 inclusive, there are at each station two sets of machinery, each set of machinery being capable of pumping 5,600,000 gallons per 24 hours against a head of 225 ft., so that while one set is pumping the other set is "spare." Station No. 1 is on the Helena River. The water is elevated 421 ft. in daily work into an open concrete tank of a capacity of 468,000 gallons, situated at No. 2 station, the total distance from No. 1 being about 1½ miles. From station No. 2 the water is pumped up about 360 ft. through 23 miles of main to the first regulating tank at Baker's Hill, about 1,080 ft. above sea level. This tank is of concrete, with a capacity of 500,000 gallons. The water runs from Baker's Hill by gravity to a second regulating 500,000 gallon concrete tank at Northam, 18 miles further on, the Northam tank being 94 ft. lower than Baker's Hill. Still falling, the water reaches the great tank at Cunderin, which holds 10,000,000 gallons, and is seventy-eight miles from the Helena reservoir. Stations 3 to 7 pump the water against a steady rise to the 8th station at Dedari, a distance of 217 miles from Cunderin, and situated at an elevation of 1,457 ft. Each station is provided with concrete tanks of 1,000,000 gallons capacity, which act as combined receiving and suction tanks. From Dedari the water is pumped a distance of twelve miles to the main service reservoir. This reservoir is of concrete, reinforced with barbed wire strands, and holds 12,000,000 gallons. Bulla Bulling supplies a small service reservoir of 1,000,000



MEPHAN-FERGUSON PATENT LOCKING BAR PIPE.

gallons on Toorak Hill, overlooking the town of Coolgardie, the mean elevation being 1,525 ft. The total head pumped against in daily working at stations Nos. 1 to 4 varies from 360 ft. to 410 ft., depending on whether one or two engines are working. At stations Nos. 5 to 8 the head is from 180 to 210 ft.

Twenty 300-i.h.p. engines, all of the triple-expansion high-duty Worthington type, were provided, the only difference in the individual engines being that eight of them had 21-in. water-plungers, and twelve had 15-in. The whole of the steam ends are standard to one size, a point which meant an economic gain, as the whole of the boilers and the accessories could also be made standard, and the number of spare parts consequently reduced. The steam ends of each engine consist of two 16-in. high, two 25-in. intermediate, and two 46-in. low-pressure cylinders, all of which, including the covers, are steam-jacketed. Intermediate reheaters, with steam at boiler-pressure, are used between both ranges of cylinders.

The Atlanta Tin Plate Co., Atlanta, Ind., will have its plant completed within a few weeks and will immediately begin operation. Money necessary to complete the work was raised by the sale of $80,000 worth of bonds.

The Eastern Machinery Market.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., Jan. 31.

The machinery market for this vicinity during the present month, was on the whole satisfactory as regards volume of business. December, as a previous report showed, was an exceptionally good month, and when it closed expectation ran high that January would witness a still further improvement. Not all these expectations were realized, however. Some dealers report that they did a little more business than in December, and perhaps they were in the majority. Still quite a few had a different experience.

The first two weeks of January were very active. Many items that had been hanging fire for some time were closed. The mails, too, were heavy, and the belief in machinery circles was strong that trade had decidedly set in for the better. But the closing days of the month brought a slight setback.

In machine tools January was marked by many developments which augur well for a good year's trade. The most important was the entrance of railroads into the market for some good-sized purchases. In some cases there were roads which have not made purchases of any consequences in nearly a year, or perhaps longer. Some of the roads in the Vanderbilt chain may be singled out, notably the New York Central. The Philadelphia & Reading road, which has had a large list out, made some fair purchasers, but the bulk of the tools it needs are yet to be contracted for, with indications good for closing in a reasonably short time. The specifications which the Pennsylvania road has had out for months also, and which call for an outlay of over $600,000, took on some life, but the orders given were insignificant in comparison with those which are yet to be placed. Definite information as to when this will be is closely guarded. The Lehigh Valley road has not as yet done anything toward equipping its East Sayre, Pa., shop, but it is shown that matters are fast reaching a point where the purchases cannot be deferred much longer. In short, throughout the month there seemed to be a disposition on the part of the railroads to purchase more readily than they have been disposed to do for some time past, and scarcely a prominent system could be named that did not at least make small purchases.

Machine tool men say the purchasing agents are more disposed to receive them than they were the greater portion of last year, and this is interpreted as meaning that the policy in the future will incline more toward making purchases than deferring them. Manufacturers, however, have not been much in evidence as purchasers during the past month, and machinery men say that it shows that while the general business situation is getting better, it is not doing so to the extent some anticipated.

Lathes continue to be the bright particular feature in machine tools, further orders from the far East having been given in the past month, with a well known Liberty street house capturing a large portion of them. The prices of lathes are stiffening, and as high as a 10 percent advance has been made by some manufacturers. There is no doubt that where immediate shipment can be made, the seller can almost name his price and get it. The prices of milling machines are about 5 percent higher than they were a few weeks ago. Careful inquiry failed to bring further advances in machine tools to light, but rumor points strongly to something in this direction being done before long. Manufacturers say they would be justified in adopting such a course in consequence of recent advances in pig iron and castings, and in some minor items.

In engines and boilers business was not as good in January as in December. There was more business in sight, but it did not crystalize into orders. For some time there has been a tendency to defer closing in this line, and if the past month did not accentuate this, it did little toward removing it. This is especially true where large horse power was involved. Price cutting plays no small part in the matter, and one large interest is pointed out as having taken the cream of recent business at prices appreciably lower than competitors are quoting. Small horse power engines were in better demand, with the outlook brighter for these than it has been. The boiler trade was quiet during the past month, although there were more orders than usual from railroads. Prices continue rather weak, and we know of some good contracts taken recently at figures some manufacturers would not name.

In electrical machinery January was fairly active, although not up to expectations. Business in sight is of gratifying proportions, and if only a fair part of the projects calling for electrical equipment are completed, orders ought to be plentiful the next few months. Prices are unchanged, with not as much disposition to make concessions as several months ago. In power transmitting machinery, there has been a slight improvement in trade. Manufacturers of wood-working machinery say their orders have been better for the past month than for the month previous. In machinists', railroad, contractors' and engineers' supplies an increasing volume of trade has appeared, especially in railway supplies.

The foreign machinery trade is better than it has been. Machine tool men have booked some good orders from this quarter during the past month. For other lines of machinery there has been an improving demand also.

The Niles-Bement-Pond Co. booked an exceptionally large number of orders during the past month, particularly from railroad sources, in which they note a greater disposition to purchase. The company also closed some good foreign contracts, notably in lathes. About May 1 the company will abandon its salesroom, which is perhaps next to the largest in the machinery district, and in which about 100 machines and a model tool room have for many years been fixtures. The expense of maintaining this salesroom has been very large, and it has been found to be unnecessary. The company has a large storeroom on West street, and hereafter this will be utilized for all of the things which make a salesroom desirable. The change will not involve the discharge of any employees, as the company's business has grown so rapidly that its working forces here stand more in need of additions than depletions.

Manning, Maxwell, & Moore report their January trade to have been very satisfactory, with orders from railroads a feature. This concern finds general conditions in the machine tool industry very promising for an excellent year's business.

The Prentiss Tool & Supply Co. booked some very good orders in the past few weeks. They find business more easily obtainable than several months ago, with milling machines especially in good request.

Hill, Clarke & Co. find business proceeding very well, with orders coming in regularly, and making up good totals.

The Ingersoll-Sergeant Drill Co. has no fault to find with business recently. Its order books are becoming more bulky and inquiries are all that could be desired also.

Rand Drill Co. reports trade perfectly satisfactory, and it extends to all their products. Pneumatic appliances especially are in good demand.

Paul Bigelow, representing the Buckeye Engine Co., closed some very good contracts during the past month. The most important include the following: two 500 H. P. engines for the Cudahy Packing Co., Chicago; three engines, aggregating 900 h. p., for the D. L. & W. road, at Kingsland, N. J.; two 250 h. p. engines for the Santiago Electric Light Co., Santiage, Cuba; two 140 h. p. engines, for the Borden Condensed Milk Co., this city.

The Hooven, Owens & Rentschler Co.'s local office reports orders for small horse power engines more numerous during the past month than for December, but it finds large work quite backward.

The A. & F. Brown Co. and the Geo. V. Cresson Co., power transmitting machinery, report trade in their line to have

been slightly better in January than for December, with the outlook for improvement better than it has been.

J. J. McCabe reports a better demand for machine tools during the past month, with business running heavier the first two weeks of it than the last.

Thayer & Co., Inc., find orders for steam boilers fell off in January as compared with December. They notice that railroads are more inclined to contract, and the Baltimore & Ohio, Long Island, and D. L. & W. roads, were some of the systems from whom they received contracts recently.

The American Wood Working Machinery Co. reports that the new year has opened up very satisfactorily. The company has booked some excellent business recently.

The A. S. Cameron Steam Pump Works, foot of East 23rd street, reports the sale of three more of their horizontal piston pumps to the O'Rourke Construction and Engineering Co., of New York City, contractors for the Pennsylvania Railroad tunnel, delivery being made to the Manhattan side. The above named construction company also has a number of Cameron pumps in use on the Weehawken side of the Pennsylvania tunnel, and along the line of the improvement in the New York Central Railroad tunnel in New York City.

New Railroad Equipment.

The Alabama Great Southern Railroad Co. (Queen & Crescent Route), has contracted for 1,550 freight cars and 12 locomotives, divided as follows: 1,000 box cars of 30 tons capacity; 200 coke cars of 30 tons capacity; 250 coal cars of 30 tons capacity and 100 self-clearing steel ore cars of 50 tons capacity. The building of these cars has been contracted for with the American Car & Foundry Co., which will build 400 box and the 100 steel ore cars; the Barney & Smith Car Co., which will build 400 box cars; the Mt. Vernon Car Co., which will build 200 box cars and 250 coal cars; and the Western Steel Car & Foundry Co., which will build 200 coke cars. The American Locomotive Co. will build the locomotives.

An equipment order to the value of $250,000 has been placed with the Barney & Smith Mfg. Co., Dayton, by the C. H. & D. railroad. The equipment is wholly for passenger service. The order consists of three postal cars, six baggage cars, ten coaches and four parlor-observation cars.

The Norfolk & Western has ordered 18 consolidation freight locomotives, nine from the Baldwin Works and nine from the American Locomotive Co. The Chicago, Rock Island & Pacific has reserved space with the American Locomotive Co. for 30 freight and passenger and 20 switching locomotives, and is now having built the 65 locomotives for which space was reserved last July.

The Erie has ordered 50 consolidation locomotives from the Schenectady Works of the American Locomotive Co. The Boston & Maine has ordered 20 passenger cars from the Pullman Co. The Wabash System is reported to have ordered 2,500 steel frame gondolas of 100,000 lb. capacity. The W. J. Rainey Coal Co., Connellsville, Pa., will build 600 steel cars at its Mt. Braddock shops. The Norfolk & Western is reported to have ordered 1,000 steel coal cars, 500 box cars, 10 passenger coaches and 11 combination coaches. The New York, New Haven & Hartford has ordered 115 cars for passenger service from the Bradley Car Works and 60 from the Wason Car Mfg. Co. The Chicago & Eastern Illinois has ordered 1,000 box cars from the American & Foundry Co.

The General Electric Co. in addition to the large vertical shaft turbines is bringing out a line of direct current horizontal shaft turbines in sizes varying from 1¼ to 300 kilowatt, and possibly larger. The larger sizes of these machines will be built for both condensing and non-condensing operation, and it is believed that they will be exceedingly desirable equipments for office buildings, department stores, or the like, where floor space is an important consideration.

SPECIALIZATION IN MANUFACTURE.*

BY ALEXANDER E. OUTERBRIDGE JR.

During the past quarter of a century radical changes have taken place in the principles and practice of manufacturing. Methods in vogue 25 years ago would not be tolerated today, and those which obtain today would not have been countenanced then. The conditions have changed to such an extent that it means practically a revolution. Textbooks that were used a quarter of a century ago are now obsolete, because they teach methods and principles that are fundamentally wrong according to the lights we have today; they are interesting historically, but practically they are worthless.

The industrial structure may be compared to that of a tree. The organization of the industry corresponds to the roots, the common basis and development to the main stem and the special lines of manufacture, which are from time to time added as the business grows, correspond to the branches of the tree. Formerly it was the ambition of the manufacturer to add as many new branches as possible to the main stem, so that the plant might cover a larger field, and also because of the supposed advantage that in case of a temporary falling off in demand for products of one kind, the establishment might be kept occupied continuously through a balancing demand for another product. Thus the manufacturer went on, year by year, adding branch after branch to his business, until the concern which may have started in a very small way, indeed, grew to great dimensions, spreading over many lines of industry. The catalogues of such establishments sometimes cover hundreds of pages, and include a vast variety of implements or goods.

This plan undoubtedly possessed certain advantages, but it also had serious drawbacks. In the case, for example, of the manufacture of machine tools, where a great variety of machines, such as lathes, planers, etc., are made, of different sizes and shapes to suit the wants of many customers, the result is sometimes the accumulation of an enormous stock of costly patterns and fixtures, which are kept in storage for years, perhaps without duplicate orders therefor, and these are finally destroyed to make room for other similar but newer accumulations. When a single new machine is ordered, it is customary to make duplicates of many of the parts. These duplicates are carried in stock for future use, sometimes for years, until in fact the design becomes obsolete, and then the patterns, fixtures and duplicate parts, which represent a large original investment of money and a continual expense for interest, storage, insurance, etc., are condemned to the scrap heap. Until this time arrives these patterns, castings, duplicate parts, etc., appear as "assets" on the books of the concern, often at a false value, for the annual allowance made for "depreciation" does not cover the ultimate loss due to obsolete fixtures and machines.

Partly as the result of experiences of this nature, specialization in manufacturing has become a prominent feature in recent years, resulting in an astonishing decrease in cost and increase in production. Specialization in manufacture means that the manufacturer selects some article or product for which there is a heavy or a constant demand, and through devoting his entire capital, energy and ability to its development and the betterment of the methods or appliances of its manufacture so reduces his costs on it as to be in at least partial control of the trade. A few illustrations, taken from actual experience, of the advantage of quantity manufacture and undivided attention will be in point.

First. To show the difference in cost where the same machinery and appliances are used, but the quantity is increased. In making two oil pumps for hammer cylinders the cost is $20.19 each; the same pumps in lots of twelve cost

*From the Annals of the American Academy of Political and Social Science for January, 1905. Mr. Outerbridge is of William Sellers & Co., Inc., Philadelphia.

$6.12 each, a reduction of 69 percent, due largely to the increased quantity, and this reduction could be substantially increased if the quantity should be further increased.

Second. To show the difference in cost where different machinery or improved processes are used. For making one hundred ¾ by 4 in. hex. head finished bolts, on a modern turret lathe, by reducing the body of the bolt from a commercial bar of hexagonal steel of a size required for the head, the cost is $15.84. Similar bolts are now made by a machine-screw company by welding electrically the head (cut from a bar of hexagonal steel) to the body of the bolt, made from a piece of cold rolled steel the exact diameter of the bolt, and sold for $5.88, which shows a saving in favor of this process of approximately 63 percent.

Third. Where an entirely new process is used. The instance taken is that of the manufacture of cores for molds, where the specialization developed a new process or made it advantageous to apply it. Certain cores which formerly cost $1.18 each, now cost 30 cents each. Others which formerly cost 56 cents each, now cost 14 cents each; others which formerly cost $6 each, now cost 90 cents each, and so on.

When Edison first made the small incandescent electric lamps, consisting of a carbon filament fixed by platinum wires in a pear-shaped glass bulb, from which the air had been exhausted, the cost was $3 each; now there are many million similar lamps of better quality made each year and sold at less than 20 cents each. Formerly watches were made by hand and were costly luxuries; now they are made by machinery in lots of a thousand at a time, and the cost of a new watch, that will keep fairly good time, is less than the cost of having an expensive watch cleaned. The same principles apply in all lines of manufacture, and it has been found that reduction in cost of production, due to specialization in manufacture, is naturally followed by increased demand, for the simple reason that each successive reduction brings a new class of consumers or purchasers into the market, and a commodity which was regarded as a luxury of the few when the cost was relatively high, becomes a necessity of the many when the cost is reduced to a sufficiently low level. When the cost has descended to the point which is necessary to establish this condition, the demand for the commodity becomes permanent, subject to occasional temporary fluctuations following variations in the general prosperity of a community or the passing of the fad if it be one.

There are, of course, dangers of overproduction in this modern system of specialization, of which we have had many evidences of late, but it seems to be pretty well recognized that the secret of success in manufacturing lies largely in concentration of effort, in developing the plant to the highest degree, so that a superior product may be turned out at a minimum cost. This implies a complete modern equipment of machinery and modern methods of management. Formerly old tools were venerated; now they are ruthlessly cast away as soon as superior machines can be obtained.

Not long ago a well-known English manufacturer visited this country to inspect our methods, and on his return he was asked "What is the secret of America's success in manufacturing?" His reply was the single word "scrapping," by which he meant that all appliances were considered obsolete in this country and condemned as soon as new improvements were found. It may be stated as a general proposition that if a new machine be invented which will, by increasing the output only 10 percent, reduce the cost an equal amount, it pays to scrap the old machine. In many instances improvements have been made which have reduced the cost of manufacture over 50 percent, and herein lies also one of the dangers of specialization in manufacture.

An establishment may have its capital tied up in a complete outfit of machinery designed to produce one article at the lowest cost, for which there may be a constant demand at a remunerative price. Then an ingenious inventor may design a new machine, or devise a new method of manufacture, which will, perhaps, produce better goods at far lower cost, and the utility of the old plant is at once destroyed. Its costly machinery may be of little or no value for any other purpose, and so a hitherto profitable industry may be wiped out of existence at one fell stroke. This is not an imaginary statement, but it can be supported by numerous facts. In England, several years ago, a clever young chemist devised a new method of producing aluminum, using sodium as an intermediary agent, the cost of aluminum being less than half that of reduction by methods then in vogue. A magnificent plant was erected, requiring an investment of several hundred thousand dollars. Before the manufacturing operations were fairly under way an American electrolytic process was brought out, doing away with the intermediary element and reducing the cost to a mere fraction of that by the sodium method. The English process was at once abandoned. A few years ago a new method of treating steel for cutting tools was devised, which enabled the tools to cut steel and iron four or five times as rapidly as could be done with any steel tools made up to that time. Shop rights were sold at large figures, and furnaces and other necessary appliances installed in several establishments for treating cutting tools according to this process. In a very short time new alloys were discovered, of which cutting tools are now made, having the same capacity without this costly treatment, and so the value of the process has been largely effaced.

The element of time was far less considered formerly than now, because it was of far less value. When wages were low and handwork in vogue, the ratio between the value of materials and of time was the reverse of what it is now, when in many manufactures the time cost exceeds all other costs. It is said that when a carpenter drops a wire nail, it is false economy to take the time to pick it up instead of using another.

The standardization of parts now so general, is at once a cause and a result of specialization in manufacture. While some large manufacturers make most of their parts in their own factory, few make all, and a large proportion buy many and some buy practically all. Many makers of parts confine their manufacture to a single one. The more recent the development of a mechanical invention, the more this practice seems to be adopted. Thus in the manufacture of automobiles the technical papers are filled with advertisements of parts; one company makes only gasoline engines, another frames, another mufflers, another radiators, another bodies, and so on. As was the case in the bicycle era, so now many of the cheaper class of automobiles are composed of "parts," purchased where they can be bought wholesale at a low rate, and "assembled" by the so-called manufacturer.

Certain fundamental principles characterize American methods of manufacture; such as the employment of special machines to perform specific operations only, whereby the output of a factory is enormously increased, minute and systematized division of labor effected, the costly work of finishing and adjusting minimized, and the highest development of skill, accuracy and dispatch acquired. The high wages paid to skilled labor in this country have acted as a stimulus to the invention and perfecting of labor-saving machinery, and the employment of such labor-saving machinery operated by high-priced, intelligent mechanics has resulted sometimes in a very much larger output and lower cost of product per man employed than anywhere in the world under old conditions. These features have perhaps received most notable development in the fine art of watchmaking by machinery in America, wherein the acme of perfection and economy is shown.

The system of concentration of labor in large factories for making watches in this country is the antithesis of the method of scattered manufacturing which prevailed for cen-

turies in Europe, notably in Switzerland. M. Favre-Peret, who investigated this industry in the New England States some years ago, stated that the average production of 40,000 workmen in Switzerland was 40 watches each per annum, while in America the average was 150 fine watches for each man employed. By the aid of special machines in these watch factories, one man can make 1,200 fine screws per day, some of which are so small that more than 100,000 are required to weigh a pound. One of the finest pieces made is a "pallet-arbor" or pivotal bolt, which, for a small-sized watch, has a thread of 260 to the inch, weighs 1-130000 of a pound, undergoes 25 operation and costs but 2¼ cents. Measurements are gauged to 1-25000 of an inch. The balance wheel, after being machined, weighs only 7 grains, and when fitted with 16 gold screws weighs 7.2 grains; there are 80 separate operations upon a balance wheel, 66 of them being drilling, threading and countersinking holes; the drills revolve at a speed of 4,800 turns a minute, and one operator can drill upwards of 2,200 holes for the balance wheels per day.

A few years ago M. Levasseur, a member of the French Institute, an authority on industrial economics, made a careful study of industrial conditions in the United States, and referred in his report thereon to the prodigious proportions which the tendency of modern industry towards specialization has assumed in this country. He described in detail the development of the shoe industry in Massachusetts to illustrate this evolution. Until 1850 shoes were for the most part made in the Bay State by farmers working at home at seasons when farm work was slack. Little by little manufactories were established, until now everything is done by machines which are marvelous in their variety and rapidity of production. Here specialization has been developed to the highest degree. One factory employing 233 hands produced 2,100 pairs of shoes a day. A delegation of French workmen, after visiting our industrial establishments, said, in their report, that "The manufacturers are unceasingly replacing old machinery by improved types. Although the McCormick Reaper Works are the oldest of the kind in the United States, we did not find there a single machine out of date. As soon as a machine can be replaced by one giving better results, a manufacturer does not hesitate to send it to the junk shop." The delegates concluded their report with these words: "The rapidity of the machines is astonishing, and the development of specialization seems sometimes to border on the marvelous."

In all lines of manufacture in the United States the same tendency towards specialization is apparent, and it is a question for serious consideration whether this process may not be carried too far, resulting in the future in a variety of unlooked-for evils. Not the least of these perhaps is the decline of the "all-round skilled mechanic." Young men who enter our shops today find employment in tending special machines and soon become highly trained in their operation, so that they earn large wages, consequent of course, upon their ability to turn out, by the aid of these machines, the maximum amount of work with minimum of defects. They are encouraged by their employers to continue at one job and feel little ambition to change to another class of work, or to another kind of machine, where their experience avails but little. Thus we have skilled planer hands, who know nothing about the operation of lathes, milling machines or other mechanical appliances in the same shops.

The Baldwin Locomotive Works, the largest of the kind in the world, and the most highly developed in specialization of manufacture, have already experienced the difficulty of finding young men competent to take the place of older hands, and have shown wise forethought in establishing a new school of apprentices, with a general superintendent in charge and a staff of supervisors or foremen of apprentices. There are at present three classes of apprentices, numbering in all between four and five hundred in these works. The apprentices are not kept for an indefinite time in any one department, but are moved from one to another as they advance in experience, so that when they have served their full terms they graduate not as skilled "planer hands" or "lathe operators" merely, but as skilled mechanics. Furthermore, this system develops a feeling of proper ambition in the young man and of attachment to his alma mater. This is, in effect, an industrial college for the poor boy, worthy of emulation by other manufacturing establishments; the mutual benefit to employer and employe will be felt in the years to come, and will continue to increase in value to all concerned.

The Alabama Pig Iron Situation.

To the Editor:

In the interest of correct appreciation of existing conditions as they bear upon the market for pig iron, I respectfully draw attention to the market report from your Pittsburg office, dated Jan. 25 and appearing in your issue of Jan. 26, in which it is stated that the coal strike in the South prevents the operation of 25 furnaces in Tennessee and Alabama, and stating further that none of the 28 active furnaces can secure enough coke, and should the strike terminate suddenly, a break in Southern pig iron prices would no doubt follow.

These premises are very incorrect and lead to erroneous conclusions. All of the furnaces now in operation in Tennessee and Alabama have a regular supply of fuel, either of local or of Virginia origin, and are subject to no irregularities except such as are incident to short car supply, which may affect this district just as much as it affects any other. There is not a single furnace active in Tennessee or Alabama today, the operations of which are intermittent because of the strike of certain coal miners.

Still more erroneous is the opinion that 25 more furnaces might be put into blast if the strike should end, and that a break in Southern prices would immediately follow. Some of the furnaces which are out need repairs or re-lining. Some are surplus stacks, held for the purpose of being blown with the same engines and boiler power when other stacks are being re-lined. Some are more or less antiquated. There are not more than six furnaces—two at Bessemer, one at Oxmoor, one in Birmingham, one at Thomas and one at South Pittsburg—that are ready for service in other respects and could be put to work if the coal strike should end tomorrow.

The strike can only end in the victory or the defeat of the union. If it should win and the present non-union miners be displaced and turned out, it would require months to gather together a full equipment of union miners who have left the district by hundreds and thousands and obtained work elsewhere. If the union should lose and declare the strike off, it would not make a great immediate difference, as 75 percent of the working places in the mines which are nominally on strike are at present occupied by non-union miners.

It is not desirable that the threat of a greatly increased Southern production should hang over the market as a bugaboo to scare alike producers and consumers. We all want to know the facts that we may govern our business arrangements accordingly. The real fact is that there is less Alabama pig iron on the market today than there was ten years ago. Our production has increased in the meantime but our local consumption has increased still more largely. Therefore, if the strike were a thing of the past and business had resumed normal conditions there would still be less pig iron produced in this district for sale in other States, after supplying our own local requirements than was the case ten years ago. This, I am sure, you can readily verify by an examination of the usual statistical data.

Birmingham, Ala., Jan. 28, 1905.

JAMES BOWRON.

LAKE SUPERIOR IRON MINES.

The work of unwatering the Commodore mine on the Mesabi range has begun. Only shaft No. 4 will be operated. The mine suspended operations three years ago.

Cole & McDonald, who have the contract for the diamond drill work at the Rolling Mill property, recently leased by the Jones & Laughlin Steel Co., have completed two holes, each to a depth of nearly 1,000 feet. The drills have been moved to new locations and new holes are being sunk at a rapid rate. It is the intention to thoroughly explore the property before any mining is undertaken. The first two holes did not show up ore of much value.

The Lincoln mine of the Jones & Laughlin Steel Co., on the Mesabi range, has resumed operations with about 150 men. Ore will be mined from the A and B shafts and a crew of men will be put to work sinking C shaft. The mine was closed down last summer. It is expected that it will ship between 200,000 and 300,000 tons next season.

There has been a marked improvement in the industrial conditions at Ironwood, Mich., since the first of the year. Every mine in the district is taking on men and more are wanted. The Newport, which operated with a crew of 50 or 60 last summer, has 350 at work now and is putting on new men. The Bonnie is giving employment to a considerable number. The Aurora has been taking on men for three weeks and will start "A" shaft shortly. A night shift of 60 men has been put on at No. 3 East Norrie, which will be increased as places can be found for new men. The same conditions prevail at Bessemer and in the district between that city and Ironwood.

The Work of completing the Oliver Iron Mining Co.'s ore ore crushing plant at Escanaba, the erection of which was begun early last spring, is being pushed. The coarse crushing side of the plant was completed early last season and temporary buildings were erected so that it could be operated. A new steel frame building will now be built over the plant and the fine crushing side will be constructed. By the opening of next season it is expected that both sides of the plant will be operated at full capacity day and night.

The Republic Iron & Steel Co. expects to ship 150,000 tons of ore from the Kinney mine of the Mesabi next season. Great activity is noticeable at the property at present. Two shifts of men are now employed opening up new territory under ground.

William Wall, captain of the Mansfield mine at Crystal Falls, Mich., died Jan. 25, age 41 years. He was for a number of years in charge of the Dober mine of the Oliver Mining Co., and went to the Mansfield two years ago.

The Gifford-Wood Co., Hudson, N. Y., recently incorporated, took possession Feb. 1. of the plants and accounts heretofore owned and controlled by Gifford Bros. at Hudson, and W. T. Wood & Co., at Arlington, Mass., and will continue to conduct the businesses which were established in 1816 and 1834 respectively, and will most strenuously push forward the corporation specialties of ice elevating, conveying and lowering machinery and the making of the finest quality of ice cutting tools, known as Wood's ice tools, throughout the country. The corporation is capitalized at $200,000, and the general office will be located at Hudson, N. Y. The manufacturing plants at Hudson and Arlington will be continued and it is probable that no new buildings will be constructed in the near future.

The change of name of the Crown Casting Co., Jackson, O., manufacturer of soil pipe and fitings, to the Crown Pipe & Foundry Co. does not signify any change of policy in its business except that it expects to add some business in the way of railroad castings and general job work.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Paris Bridge & Supply Co., Paris, Ill., recently incorporated, expects to install some new machinery and make a specialty of structural material for bridges.

Th American Manganese Co., of New York City, has been incorporated with a capital of $1,750,000 to deal in brown hematite and other iron ores and manganese. The directors are: Edgar Madden, H. O. Vincent, Daniel Cobb, Thomas J. Finney, William H. Miller, A. C. Perry, George Shaskan, L. B. Ostrander and Alexander Baxter, of New York.

The Cryer Return Line System, New York, capitalized at $25,000, has been incorporated to manufacture valves, etc. The incorporators are: George A. Morrison, Cranford, N. J.; A. A. Cryer, Newark, N. J.; Leo A. McTigh, Brooklyn.

Chicago Special Machinery Co., Chicago, has been incorporated with a capital of $5,000 to manufacture machinery. The incorporators are: F. G. Dickerson, A. H. McDonald and Michael J. Walsh.

The General Insulate & Machine Co., Brooklyn, has been incorporated with a capital of $50,000. The incorporators are: L. Swanson, J. Steinberger and A. S. Hart, all of Brooklyn.

The McDonald Iron Works, Brooklyn, have been incorporated with a capital of $5,000. Objects, metals and hardware. The incorporators are: Jos. McDonald, Elena McDonald, R. C. Chalmers, all Brooklyn.

The Turner Machine Co., New York, has been incorporated with a capital of $5,000 to manufacture machinery. The incorporators are: Vitor Sence, J. McCaskie and Jos. Lichtenberg, New York City.

The International Gas Machine Co., of Iowa and Nebraska, is the name of a new concern incorporated at Sioux City, Ia. It is capitalized at $25,000. The directors are: J. H. Osborne, William Warnock, William Ahern, Withfield Stinson and Mamie M. Montgomery.

W. G. Gregory, care of the Mountain City Foundry & Machine Works, Greenville, S. C., will want a 2 x 2 x 6 ft. planer, new or second-hand; portable boring bar to bore up to about 56-in. cylinders and valve seats. Will later be in the market for new or second-hand 5-ft. boring mill.

The Detroit Steam Engine Co., Detroit, Mich., has been incorporated with a capital stock of $50,000, of which $5,500 has been paid in property. The stockholders are: John D. MacLachlan, Ovid B. Law, Wm. E. Higinbotham and Wm. G. Malcomson.

The Continental Motor Mfg. Co., Chicago, capitalized at $2,500, has been incorporated to manufacture machinery. The incorporators are: Richard H. Mather, Willis H. Hutson and Benson Wright.

The Kokomo Boiler Compound Co., Kokomo, Ind., has been incorporated with a capital of $25,000. The incorporators are: Wm. H. Brandon, Wm. H. McReynolds and Henry B. Rieber.

The Sandelbach Wheel Co., East St. Louis, capital stock $25,000, has been incorporated The incorporators are: Edw. C. Sandelbach, E. G. Sandelbach and E. H. Kanby.

The Conner Woods Machinery Co., Sarnia, Mich., capitalized at $40,000, has been incorporated to manufacture self-feeders, windstackers and portable saw mills The officers are: President, G. F. Connor; vice president and general manager, Fred Woods; secretary and treasurer, D. E. Purdy.

The American Chocolate Machinery Co., Brooklyn, N. Y., has been incorporated with a capital of $75,000 to manufacture and sell machinery. The directors are: John R. Van Derveer, Frank H. Page, John J. McBonde, Henry H. Bowman and Geo. C. Baldwin, of Brooklyn.

The Everlasting Steel Casket Co., Detroit, Mich., has been incorporated to manufacture and deal in steel caskets, patented,

and general undertakers' supplies. It has an authorized capital of $250,000, of which $80,000 has been paid in the form of the patent on a steel casket, and $150,000 has been subscribed. Stockholders are: Louis I. Lefebvre, Thomas S. Richard and Grove H. Secor.

The Brooklyn Telegraph & Messenger Co., Brookyln, has been incorporated with a capital stock of $100,000. The directors are: M. K. Macdonald, A. E. Grinnell, E. W. Hunt, L. Macdonald, Albert T. Leonard and A. F. Kelly, of Brooklyn, and E. W. Hunt, of Yonkers.

The Isthmian Canal Commission, Washington, D. C., is asking for sealed proposals for furnishing stone crushers for use in building the Panama canal. Proposals will be received until Feb. 15.

The Decatur Cornice & Roofing Co., Decatur, Ill., has not definitely decided upon its plans, but may add a few sheet metal working machines and buy a corrugating machine, and also add to its power either electric or gasoline.

The Waco Machinery & Supply Co., of Waco, Texas, capitalized at $25,000, has been incorporated to manufacture and repair machinery. The incorporators are: A. P. Duncan, W. W. Seely, F. M. Gardner, W. S. Heard, W. R. Clifton, A. L. Elliott and A. H. Bell.

The Kingsland-Kay-Cook Mfg. Co., St. Louis, Mo., has been incorporated with a capital of $120,000 to manufacture and deal in iron, brass, steel, sheet metals, tools and machinery. The incorporators are: George Kingsland, Arthur H. Kay and Abraham Cook.

John Davis, 52-54 North Washington street, Boston, Mass., wants a 24-in. to 30 x 10-in. rotary bed planer.

Davis & Forrest Machine Works, Savannah, Ga., wants 36-in. x 18 or 20-ft. lathe, 18-in. x 10-ft. lathe, 48-in. boring mill; new or second-hand, in good condition.

Bosworth Coal & Coke Co., Chenoa, Ky., wants prices on coal buggies, picks, shovels and blacksmith tools.

Bartlett-Tewksbury Machinery Mfg. Co., Gate City car line and Forty-second street, Birmingham, Ala., wants addresses of builders of oscillating engines.

The Proctor Furniture Co., J. C. Sterchi, general manager, Knoxville, Tenn., will be in the market for 100-h. p. engine and 80-h. p. boiler.

W. W. Clark, Box 226, Shelbyville, Tenn., wants engine and boiler.

Fires and Accidents:—

The plant of the Woolsey Wheel Co., Sandusky, O., was totally destroyed by fire on the night of January 25. The loss is estimated at $110,000; insurance, $35,000. About 200 men are thrown out of employment.

Fire in the three-story machine shop of Swift & Co., Forty-second street and Ashland avenue, Chicago, January 22, resulted in a loss of $5,000.

Fire at the plant of the Eureka Foundry Co., Birmingham, Ala., January 23, caused a loss of $2,500.

As a result of the explosion of a boiler in the Standard Wheel Works, Terre Haute, Ind., January 25, two men were killed and the boiler room was wrecked.

Fire in the building of No. 305 Pearl street, New York, January 24, caused a loss of $75,000. The heaviest losers were Arthur P. Webb, proprietor of a machine and elevator shop, and the Burrows Metal & Tin Box Co.

The entire plant of the Menominee Electrical & Mechanical Works, Menominee, Mich., was destroyed by fire, January 22, with a loss of $50,000 and an insurance of $37,500.

At Toronto, Ont., Jan. 24, fire for the second time in a year broke out in the plant of the Reeves Pulley Co. Total damage, $16,500.

The machine shop of the Louisiana Lumber Co., Rochelle, La., was burned Jan. 26. Loss, about $75,000.

Fire destroyed the Denver & Rio Grande railroad shops, Gunnison, Col., Jan. 17. Loss, $50,000.

The Mount Carmel Axle Works' plant, Mount Carmel, Conn., was burned Jan. 27. Loss, $30,000; insurance, $18,000.

New Construction:—

The work of clearning away the debris from the site of the Economy Foundry, Syracuse, N. Y., has been begun preparatory to the erection of the new plant for the Central Iron Works. The buildings of the Economy Foundry were destroyed by fire shortly after the Central Iron Works purchased the property. The new plant will cost about $50,000.

The Cincinnati Iron Fence Co., Cincinnati, recently incorporated, has leased a building at 118-120 West Second street, which will give ample floor space for the present. It is the intention of the company to build a plant next fall, which will furnish about 75,000 sq. ft. of floor space.

The Lebanon Valley Furnace Co., Lebanon, Pa., owner of the Lebanon Valley furnace, has torn down the stack and will rebuild it.

The Republic Iron & Steel Co. will build 400 ovens near Uniontown, Pa. The erection of the ovens will begin in about six weeks.

The Armstrong Brothers' Tool Co., Chicago, will construct in the northwestern part of that city a large plant for the manufacture of tools.

The J. D. Connell Iron Works, New Orleans, La., have leased land on which they will erect a plant for the general repair and construction of vessels.

The Werner & Pfleiderer Co., Saginaw, Mich., is building an addition to its plant, 75 x 40 ft., and will soon be manufacturing new kinds of machinery. The addition will be completed in about a month.

The Phillips & Buttorff Mfg. Co., Nashville, Tenn., which last year made two additions to its foundry, contemplates still further enlarging its plant. The new building will be 100 x 80 ft., five stories.

The Buckeye Steel Castings Co., Columbus, O., will begin work at once on a new 25-ton open-hearth steel furnace. This will make four open-hearth furnaces at the plant and enable it to greatly increase its output. A large number of orders are now on hand, especially in the car coupler department.

The United States Hoe & Tool Co., Columbus, O., recently incorporated with a capital of $150,000, will begin at once the erection of a large plant on West Spring street. Plans provide for a building 100 x 600 ft., and 100 men will be employed. The company will manufacture hoes, rakes, forks and other farm implements.

The Eureka Stove Works, Birmingham, Ala., has bought out the Eureka Foundry & Machine Co., has changed the name to "Eureka Stove Works" and has increased the capital stock from $5,000 to $50,000. The company is building and equipping a foundry 80 x 102 ft. and an office 20 x 40 two story, also a pattern house, all buildings to be of brick and iron. The foundry will employ 30 molders. The company will manufacture a complete line of modern stoves and ranges, hollow ware, grates, and all kinds of stove repairs. It expects to be in operation by May 1. It is doing job work now.

The Niles Corrugating Co., Niles, O., manufacturer of corrugated iron and steel roofing, is building a complete roofing plant for which it has purchased machinery and power equipment. The company expects to be in full operation by the first of March.

The Winslow Bros. Co., which has for many years been located at Carroll avenue and Ada street, Chicago, has purchased a new site consisting of two blocks of property, bounded on the east and west by West Forty-sixth and West Forty-seventh avenues, and on the north and south by Van Buren, Congress and Harrison streets, and will shortly begin the construction of a new plant involving an expenditure of about $200,000. A plant of the most modern type will be constructed with independent buildings for the different departments, all of which will be electrically equipped. The build-

ings will be of brick and stone, the interior being in some instances fireproof and in others mill construction. Construction will be commenced as soon as frost is out of the ground with a view to having the buildings completed in the fall. The company has been established in Chicago for 20 years and has engaged in the manufacture of ornamental iron and and bronze work. The business has outgrown the old plant.

The Heindel Foundry Co., Hanover, Pa., has completed the construction of its new plant, which will be equipped and ready to make all kinds of castings early in February.

The Columbus Pneumatic Tool Co., Columbus, O., will soon move into its new plant, which it hopes to have completed by the 15th of February. The company is enjoying much foreign business, Japan and Russia being especially good customers.

The Schwab Safe & Lock Works, Lafayette, Ind., will build a foundry, 60 ft. wide and 100 ft. long, of brick.

The Bass Foundry & Machine Co., Ft. Wayne, Ind., has added to its capacity so that its daily output of car wheels will be increased from 550 to 650.

The Corinth Engine & Boiler Works, Corinth, Miss., contemplate the erection of a boiler shop and warehouse in the spring and summer. It has not been decided whether the material will be of steel or brick.

The Wm. J. Oliver Mfg. Co., Knoxville, Tenn., which now has a large foundry and machine shop, expects to double its capacity. As soon as the weather permits it will commence the erection of a large foundry. In addition to manufacturing car wheels, the company will do a general foundry business. Most of the equipment needed is now in use at the present foundry. In addition to its specialties, contractors' cars and contractors' outfits including nine cars and coal mine machinery, the company rebuilds locomotives for the Southern trade.

General Industrial Notes :—

The American Tool Works Co., at present located at Sixth street and Eggelston avenue, Cincinnati, is considering the obtaining of a new site for its plant. At the annual meeting held a few days ago, the present directors were re-elected. The annual report of President Alter shows that while the past year was a dull one, the company made a very satisfactory showing, and after paying all fixed charges, about $10,000 was added to the surplus, which now amounts to about $60,000. During the year the company operated on an average about 65 percent of its capacity.

The Lake Shore Engine Works, Marquette, Mich., have made an agreement whereby the Canada Launch Works, of Toronto, will manufacture the Superior gas engines. Heretofore the Superior engine has not been introduced into Canada, the duty of 25 percent being practically prohibitive.

The Smith & Winchester Mfg. Co., South Windham, Conn., has been organized to continue the business of the Smith & Winchester Works. Operations of the former company have been limited for some time, the principal business of the plant being done by the Jones Co. The new concern will absorb both the Jones Co. and the Smith & Winchester Co. About the same line of machinery, consisting principally of paper and laundry machines, will be manufactured. The capital stock of the company is $15,000.

It is understood that the American Bridge Co., is now shipping to Japan a complete duplicate order of the bridge material lost by the sinkng of the steamer Knight Commander by Russian warships. The value of the steel work is about $250,000.

Walter H. Storm & Co., 26 Cortlandt street, New York, are making a specialty of the manufacture of light castings, such as stair treads, risers and newel posts, having made contracts with a large part of the New York trade for the year 1905 for the stair work used in tenement and apartment houses. The company will also turn out machinery castings. One of the incorporators of the company is Chas. A. Canner, Flushing, N. Y., not C. O'Connor, of Flushing, as was recently stated in these columns.

The Kuhn Foundry Co., Buffalo, N. Y., recently incorporated, has taken over the plant formerly occupied by the Buffalo Foundry Co. Joseph Kuhn, the general manager, has closed his shops at Niagara Falls, N. Y., and moved the tools, machinery, etc., to the Buffalo plant.

The J. G. Brill Co., Philadelphia, advises us that, while it is true that the John Stephenson Car Works, of Elizabeth, N. J., were purchased by interests friendly to the J. G. Brill Co., the Stephenson company is a separate organization and will be operated as such.

The office building of the Howard Thermostat Co. and the Steam Carriage Boiler Co., Oswego, N. Y., was recently destroyed by fire. This made it necessary for the companies to make temporary arrangements for an office, which will not in any way interfere with shipping goods. Within a short time the companies will have their entire plants into larger quarters which are now being fitted up.

The Summit Foundry Co., Geneva, N. Y., will establish a branch at La Crosse, Wis. L. C. Colman, Frank P. Hixon, J. M. Hixon and other business men of La Crosse has purchased stock in the Summit Foundry Co. and made possible the establishment of the branch at La Crosse. The company will occupy the plant formerly used by the Fountain City Drill Co., and the buildings will be remodeled to suit the business of the new occupant. It is expected that by the first of June the plant will be in operation and that 40 to 50 men will be employed at that time. The company will manufacture stoves and ranges.

At the annual meeting of the West Virginia Bridge & Construction Co., Wheeling, W. Va., directors were elected as follows: Hon. S. B. Elkins, Edward Hazlett, W. E. Stone, J. J. Holloway, C. R. Hubbard, E. W. Oglebay Chas. F. Paxton, W. A. Wilson and Geo. A. Laughlin. W. A. Wilson, the only new member of the board, succeeds J. H. Barrett, who recently resigned, as general manager.

At the annual meting of the stockholders of the Wheeling Mold & Foundry Co., Wheeling, W. Va., directors were elected as follows: W. B. Jones, L. V. Blue, B. W. Peterson, C. H. Copp, A. C. Whitaker, C. E. Blue and Geo. A. Laughlin. The following officers were elected: C. E. Blue, president; L. V. Blue, vice president, and C. C. Woods, secretary.

In a 12-hour turn last week 583 ingots were rolled into tin bars and billets at the Ohio works of the Carnegie Steel Co., Youngstown, O. The best previous record for this mill was 581 ingots in the same time.

At the annual meeting of the Standard Tin Plate Co., Canonsburg, Pa., directors were elected as follows: J. Underwood, S. A. Taylor, S. Cook, Louis Follett, W. H. Richards, J. V. Cook, C. C. Johnson, G. D. McNutt, E. E. Boyle, J. L. Cockins, J. B. Johnson and S. L. Kennedy. Officers were elected as follows: Joseph Underwood, president; J. V. H. Cook, treasurer; Louis Follett, secretary, and W. H. Richards, general manager.

James Davis, foreign sales agent of the Lima Locomotive & Machine Works, Lima, O., has sailed for his fourth trip to England, South Africa, Australia, Japan, China and the Philippines, in which countries he has introduced the Shay type of locomotive made by the company. The plant at Lima has been doubled within the last year, and now has all the orders it can take care of for some time to come.

The Chicago Pneumatic Tool Co., Chicago, has purchased the Chicago Battery Co., whose plant is located at 1255 Michigan avenue, Chicago. The company manufactures storage batteries for train lighting, automobile work and similar uses. The batteries will be sold partly in connection with the new electric drills and tools being put on the market by the Chicago Penumatic Tool Co., which is branching into the electrical business rather extensively.